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TABLE OF CONTENTS

Integrating Mathematics and Industrial Arts ..... *Maurice Nadler* 215
Avocational Courses in the Veterans Training Program .. *Harry S. Belman* 218
Methods of Teaching Occupational Subjects ..... *C. A. Felker* 220
Some Leaders in Industrial Education ..... *William T. Bawden* 222
New Technique in Teaching Current Events ..... *Kenneth G. Horvath* 224
Closing the Shop at the End of the School Year ..... *H. A. Allender* 225
Editorials 226
Course Outline for Related Subjects in Carpentry ..... *Carlton Dwight* 227
Teaching Materials for Industrial Education ..... *Chris H. Groneman* 229
Qualities Required in Distributive Education Teachers . *Donald K. Beckley* 231
Sunburns and Heatstroke in Industry ..... *Waldemar Schweisheimer* 232

Problems and Projects

Cleanup Assignment Wheel ..... *Louis S. Taylor* 233
A Handy Name Stamp ..... *Charlie Hepfinger* and *Don R. McMahill* 234
Portable Picnic Grill ..... *Homer C. Rose* 234
Sheet-Metal Mailbox ..... *Glen M. Kibler* 236
Matchbox Holder ..... *O. R. Bannister* 237
Hot Wire Jig Saw ..... *A. G. Beleson* 237
A Lamp That the Average Shop Student Can Make ..... *H. A. Allender* 238
Logarithms Made Easy ..... *S. G. Colinese* 239
Height Gauge for Medical Department ..... *Wm. K. Nevard* 242
A Lawn Novelty — Huck Finn Fishing ..... *Harold O. Akeson* 243
Portable Projector Stand ..... *H. H. Ziemer* 244
A Project in Baking ..... *E. W. Sudlow* 244
Indian Silversmithing ..... *Ben Hunt* 244
Fire Drills 245
Bedside Table ..... *Louis Barocci* 245
A General Printing Project Work Sheet ..... *Israel Bensman* 246
Elementary Auto Mechanics ..... *Frank B. Miller* 249
Art-Metal Trays ..... *Augustine J. Brezina* 250
A Creed for the Industrial Arts Teacher ..... *Heber Allen Sotzin* 253
Industrial-Arts Records ..... *Roland O. Byers* 10A

Association News 254
Personal News 12A
News Notes 15A
New Publications 18A
Shop Equipment News 20A

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Best Wishes to Our Readers

Vacation time — that period of the year when one can do, more or less, what he desires to do, is swiftly approaching.

What do you, dear reader, desire to do? Are you going to summer school, or are you going touring and camping? Or, perchance you are planning on working at your trade, partly to renew your acquaintance with the practical side of the subject you are teaching during the school year, and partly to help maintain your financial boat on an even keel.

Whatever the purpose of your vacation endeavors, may you enjoy every minute of your free time, and may you come back, full of enthusiasm and strength to tackle the work of the school year 1948–49.

This Month's Cover

The cover picture this month shows Instructor Lonnie Gilliland giving a demonstration in his cabinetmaking shop at Capitol Hill High School, Oklahoma City, Okla.

Coming Conventions

June 21–23. National Graphic Arts Education Association at New York City. Director, Fred J. Hartman, Room 412, 719 15th St., N.W., Washington 5, D. C. Headquarters, Hotel Pennsylvania.

July 5–9. National Education Association at Cleveland, Ohio. For further information address N.E.A. Headquarters, 1201 16th St., N.W., Washington 6, D. C.

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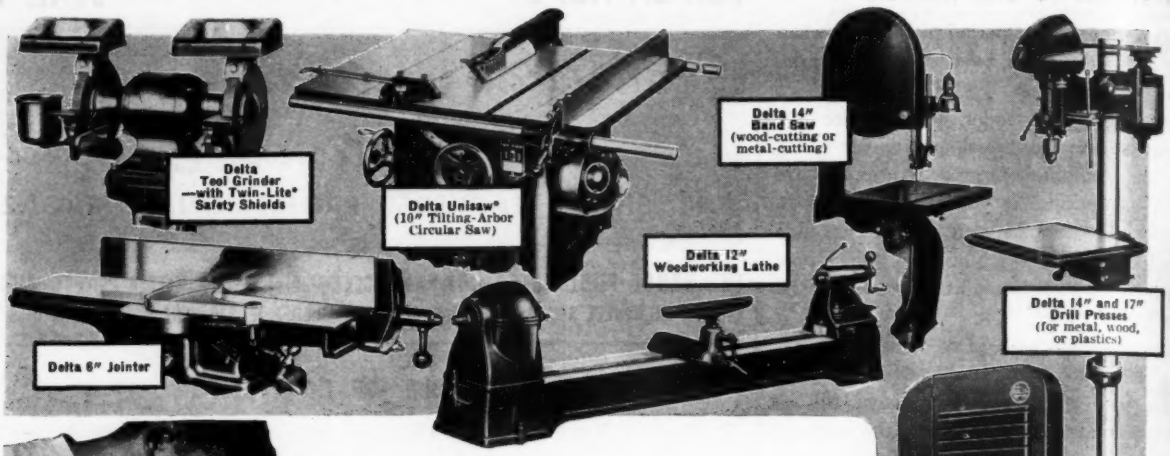
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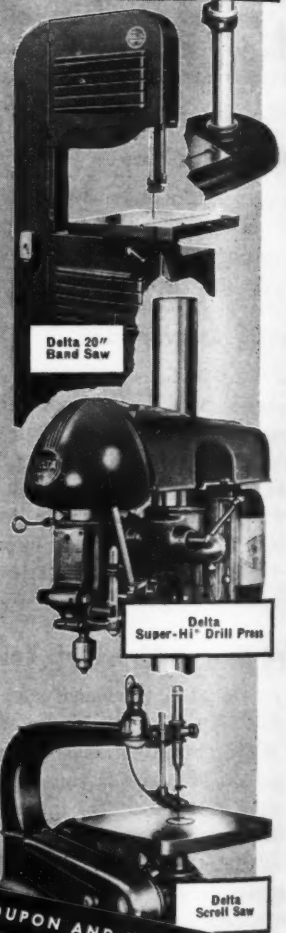

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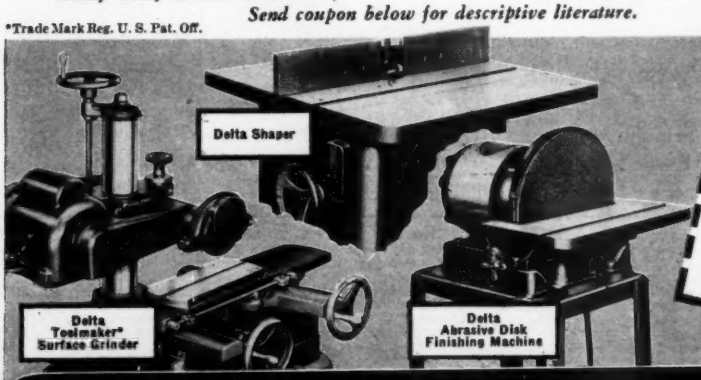

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Integrating Mathematics and Industrial Arts

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New York City

In the traditional curriculums, where subjects are taught along almost completely independent lines, numerous difficulties and problems have arisen. Subjects which are very closely allied have been made to appear to students as completely disassociated fields. Some illustrations are English and social studies, shop and science, mathematics and shop, mechanical drawing and industrial arts, and history and civics. As a result of the independent treatment of various subjects, learning is made more difficult for the pupils. The student is untrained in the utilization of certain aspects of one subject useful in another. There is no planning by schools for the introduction of certain parts of courses, when they are useful for other allied subjects. Finally, the student is given a wrong impression of life's activities, and lacks the efficient use of knowledge and skills gained in schools for the solution of life's problems.

One subject for which this is particularly true is mathematics. The science and shop teachers are frequently heard asking about what is possibly being taught in mathematics classes, when students in shop and science classes seem to know no basic mathematics for use in these other subjects. Students in the traditional mathematics classes usually are not being trained in the utilization of the subject in practical applications in other fields. Furthermore, the parts of the subject are not introduced parallel to other courses for which the mathematics can be utilized, at the appropriate time. An even more serious condemnation of the subject is an apparent lack of value in actual life. Adults often complain that they have failed to use their mathematical knowledge since their school days. No doubt, there exists an educational problem here requiring solution.

The Role of the Industrial Arts Program

Numerous lofty aims have been developed recently for the industrial-arts program.[1] B. Goodykoontz, assistant commissioner of education, writes,[2] "Industrial arts, parallel with other subjects and curriculums and correlated with them, contributes to the realization of the goal of enlightened citizenship." In the report of the committee appointed by the commissioner of education, the following statement is made,[3] "Likewise, industrial arts has come to mean a broad program — the organization of economic, social, scientific, materialistic, and idealistic knowledge, as such is related to the lives of people in an industrial age." Integration of many subjects in the industrial-arts program is definitely one of the important aims of the modern program.

A careful study of the aim of integration in the industrial-arts program, and a survey of the ills of the conventional program of studies, indicate a close connection between the two, and show that it may be possible to alleviate the problems of the traditional schools through the proper teaching of the industrial-arts program. In this article, the study will be confined to the integration of mathematics in industrial arts.

Mathematics in Industrial Arts Activities

Numerous activities in industrial arts involve a knowledge and application of mathematical concepts and skills. These will be summarized briefly under the headings of various branches of industrial arts. Under each heading will be listed a number of topics in the activity, which utilize mathematics in the industrial-arts shop.

Ceramics.[4] Percentage composition of clays. Measurement of ingredients in mixing clay. Measurement of wood forms for making tiles. Ratio of heights to bases in design. Use of squared paper in design of contours. Measurement and making templates. Measurement of numerous objects in design and construction. Preparation of glazes, percentage composition and parts by weight. Psychometric cones. Temperature of kilns, centigrade and Fahrenheit. Use of geometric figures in design.

Electricity.[5] Voltage in series and parallel circuits. Amperage in series and parallel circuits. Resistance in series and parallel circuits. Ohm's law. Number of turns on a coil. Primary and secondary of a transformer. Cost of electrical equipment. Cost of electrical energy.

Graphic Arts.[6] Point system. Setting type. Spacing type. Sizes of paper, stationery, letterheads, envelopes. Paper sizes for various types of jobs. Use of brass rule. Constructing borders and tables. Figuring weights of reams of paper, book paper, bond paper — proportion. Figuring and cutting stock. Measurements in book binding and in making portfolios.

Leather.[7] Design of projects. Layout of objects. Measurement of leather. Measurement of dimensions of objects. Layout of geometric designs. Interpretation of scale drawing. Estimating materials.

Machine Shop.[8] Centering stock. Angles of rake. Units of measure. Circumference, r.p.m., cutting speeds. Grinding and setting a roughing tool. Inside, outside, and hermaphrodite calipers. Steel rule and fractions. Slide calipers. Combination set. Micrometer caliper. Microm-

[1] Education Committee on Industrial Arts, *Industrial Arts, Its Interpretation in American Schools.* United States Department of Interior, Office of Education, Bulletin 34, 1937.
[2] *Ibid*, p. v.
[3] *Ibid.*, p. 64.
[4] J. W. Dougherty, *Pottery Made Easy.*
[5] A. W. Dragoo and K. L. Dragoo, *General Shop Electricity.*
[6] A. Marinaccio and B. N. Osborn, *Exploring the Graphic Arts.*
[7] A. Mickel, *Leather Work.*
[8] G. C. Whipple and A. C. Baudek, *Engine Lathe Operations.*

eter depth gauge. Vernier calipers. Fraction-decimal conversion. Bevel protractor and vernier. Tolerance and fits. Johnson gauge blocks. Grinding and setting facing tools. Grinding and setting finishing tools. Grinding and setting other tools. Tapers and setting the compound rest. Using an offset tailstock. Screw threads, pitch, lead, thread angle, pitch diameter. Thread cutting formulas. Measurement of pitch diameter. American standard thread. Grinding and setting thread tools. Acme thread. Gear and pulley trains.

Mechanical Drawing.[9] Measurement of degrees. Parallel lines and perpendicular lines. Circles and other curves. Scales. Revolution — axes. Threads and bolts. Gears and cams. Complex curve construction. Development in sheet-metal construction. Measurement in architectural drafting. Structural drafting. Map drafting. Contours.

Metalwork.[10] Use of steel scales — graduations. Laying off distances. Reading calipers. Measuring thickness. Lay out with square. Protractor head. Centering device. Adding metal for seam. Locating hole for punch. Sizes of drills — fractions and decimals. Cutting edge of a twist drill. Angle of a cold chisel edge. Bend allowance. Selecting taps.

Textiles.[11] Lengths of fibers in in., ft., yd. Degrees of twill lines. Geometric designs in weaves. Bedford cord weave, pique weave. Lengths of cotton fibers. Percentage wool composition. Sizes of blankets. Weights of wools. Contents in given weight of yarn. Testing color fastness to washing. Shrinking of cloth. Weighting of silk.

Woodworking.[12] Laying out stock for cutting. Measuring and dividing lengths. Sharpening tool edges. Using dividers to lay out curves, and to divide space. Hexagonal and octagonal designs. Laying out irregular designs on squared paper. Layout of chamfer. Use of protractor. Use of sliding T bevel. Measuring and laying out dado, cross lap joint, mortise-and-tenon joint, dowel joint. Reading a scale drawing. Calculating board measure. Preparing a bill of materials. Size, length, and number of nails per pound. Percentage moisture in lumber.

Classification of the numerous mathematical problems involved in the various industrial-arts activities reveals the content of a standard one-year course in general mathematics. This includes arithmetic, geometry, algebra, and trigonometry of the right triangle. Problems in industrial arts require a knowledge of arithmetic, for the four fundamental operations with fractions and decimals, for percentage problems, and for measurement and cost problems. Under the heading of geometry, are problems in laying out designs, a knowledge of angles, perpendicular and parallel lines, use of dividers in geometric constructions, and straight line and curved line geometric figures. The algebra is needed for formulas, solution of simple problems, ratio and proportion, areas, and square root. A knowledge of the tangent, sine, and cosine functions, and their use in simple computations of lengths and angles, comprise the use of trigonometry of the right angle.

[9]T. E. French and C. L. Svenson, *Mechanical Drawing.*
[10]F. E. Tustison and R. F. Kranzusch, *Metalwork Essentials.*
[11]Bureau of Industrial and Technical Education, *A Suggested Course of Study in Applied Textiles,* University of the State of New York, State Education Department.
[12]Fryklund and A. S. LaBerge, *Woodworking.*

Methods of Integrating the Mathematics With Industrial Arts

There are several methods of integrating the mathematics with the industrial-arts program. No one universal method can be recommended for all situations. Various factors will determine the choice of the particular procedure utilized. Among these factors are the past and present mathematical training of the students, the intelligence and ability of pupils, the mathematical ability of the industrial-arts instructor, the time available for the integration, the characteristics of the particular class, and other unique conditions. The following methods are suggested for the integration. Either any one or a combination of the procedures may be utilized in any situation. Experimentation and experience will govern the choice.

Incidental Treatment of the Mathematics

Numerous industrial-arts activities involve very simple mathematics. Only the poorest pupils will be incapable of solving the problems without special instruction by the instructor. For example, in taking shop inventory, it is necessary to count items, and to add and multiply whole numbers. In the ninth year or higher, this much mathematical knowledge can be expected. In layout work, simple projects may involve reading and measuring whole numbers of inches. These illustrations, and many other situations, offer no special problem in separate treatment of the mathematics.

Nevertheless, the integration of the mathematics with the industrial arts is present. The introduction of the use of the mathematics is incidental to the industrial-arts activity. However, the student is using mathematics and is making use of the subject in a real situation. He is gaining skill in mathematics, while practicing its application.

The teacher must exercise proper judgment as to whether the incidental method of integration should be used. He may underestimate the difficulty of mathematics. If this mistake is made, student difficulties will become apparent. Experience will teach the instructor to use a different type of integration next time.

Use of a Reference Library

Other industrial-arts activities require more advanced mathematical knowledge. There may be insufficient time to treat the mathematics independently. Perhaps it is a problem encountered by a single student in a special project. There may be other reasons for avoiding instruction in mathematics, even though the student may need some help. Yet the need for the assistance to the pupil exists.

A good reference library can be used to aid the student in the solution of a mathematical problem involved in an industrial-arts activity. Some textbooks in fields of industrial arts have separate portions of the books devoted to the treatment of the mathematics needed for the activity.[13] Other textbooks in mathematics are organized for use in particular technical fields. There are mathematics textbooks for printing, plumbing, electricity, machine shop, automotive trades, aviation, agriculture, and many other fields.[14] Finally, there are numerous textbooks in mathematics. A suitable selection will provide a useful library for integration of mathematics with industrial arts.

In an appropriate situation, a pupil can be referred to the library for solution of his problem. He can be given a reference to a specific book and page. On the other hand, he can be required to find a suitable reference by himself. Whichever means is utilized, the student will gain by the application of mathematical knowledge to the industrial-arts activity.

The Project Method of Integration

A very efficient method of integration is through the use of industrial-arts projects. In many projects in industrial arts, the mathematics is inseparable from the content. The project may be a standard one, or may be devised especially for the purpose of the integration. The instruction is unified, without apparent emphasis on any aspect of the activity. The student gains in mathematical skill and in industrial-arts content, receiving the training in a real, unified, activity.

As an illustration, the use of precision instruments is necessary in machine-shop work. At the same time, it is probable that the students will be very weak in decimals. Instead of following the usual pattern of teachers, namely, bemoaning the situation, complaining of pupils and teachers, the instructor can exploit the circumstances for integration. The graduations on the micrometer will introduce a review of the

[13]Tustison and Kranzusch, *op. cit.*, pp. 1–12.
[14]McMackin and Shaver, *Mathematics for the Shop.*

concept of decimals, their reading and writing. Measurement exercises will provide drill. Addition and subtraction of decimals will be reviewed through determination of over-all dimensions, and through the determination of unknown dimensions. Other precision instruments will provide similar opportunities for integration.

Student organizations for industrial-arts activities offer considerable occasions for integration with mathematics. Through the collection of dues, the purchase of materials and equipment, the sale of articles, and the computation of cost, profit, and mark up, valuable training is given the student in mathematics, as well as in many other useful items of information.

In the project method, the teacher should consciously avoid any appearance that the class is one in mathematics, for that it is not. The class is one in industrial arts. The mathematics is an integral part of the activity. Its instruction becomes an inherent part of the industrial arts.

The Problem Method of Integration

Frequently, problems arise in industrial-arts activities necessitating the use of mathematics, for which the students have been inadequately prepared, or totally unprepared. In such case, separate instruction may have to be given to the class or group. While the industrial-arts instructor will be serving for the moment as a mathematics teacher, the instruction in mathematics will be given for a concrete purpose. Its introduction will be integrated with the industrial-arts content.

In teaching the solution of the problem, it will be advisable for the industrial-arts instructor to adopt suitable techniques. Charts, diagrams, the blackboard, colored chalk, other visual aids, and student notebooks should be utilized. The instructor may have to use the reference library or may need to consult with the mathematics teacher. Once the industrial-arts teacher has decided to teach the mathematical topic, he must set aside the necessary time and effort to the task.

A simple illustration of this method of integration would arise in the use of a hexagonal design. The teacher should commence the solution on the blackboard, while the students work in their notebooks. The explanation should be given step by step, while the pupils follow in their notebooks. Then the students should be given the opportunity of practicing the construction, using different sizes of circles, while the teacher passes around, giving individual instruction where necessary. Finally, the layout on the actual material should be performed.

Problems in Integration

The integration of mathematics with the industrial-arts program raises a number of problems. In view of the need for knowledge by the teacher of mathematics, obviously his training must include sufficient mathematics to meet all situations in the industrial-arts program. Broad training of the industrial-arts teacher is recommended by the education committee on industrial arts.[15]

Lack of proper mathematics training of students is a second problem. Of course, the industrial-arts teacher cannot spend the time to go back to the very foundation of the students' knowledge. He must assume some basis to build on. In cases of most inadequate student background, he must refer the student to outside material in mathematics, or to the mathematics instructor.

To make the instruction in mathematics more effective, suitable texts and visual aids must be utilized by the industrial-arts instructor. Again, it may be wise to consult with the mathematics teacher. Such cooperation may also be needed to avoid inconsistencies in the teaching of the subject by the mathematics instructor. Difficulties may otherwise arise, both for the mathematics teacher and the industrial-arts teacher.

Shall the students be held accountable for the mathematical knowledge and skill reviewed, developed, and utilized in the industrial-arts activity? If the answer is yes, then in what manner shall they be required to exhibit evidence of this learning? First, the correct performance of the industrial-arts activity will reveal accurate use of the integrated mathematics. Second, examinations should include questions in industrial arts requiring the use of some of the mathematics previously integrated.

Advantages of the Integrated Program

The integration of mathematics with the industrial-arts program will serve to carry out one of the important aims of the industrial-arts program. In connection with this aim, in general, the education committee on industrial arts states:

Here they may explore and experiment; here they may bring their mathematics, science, language, and even history and put

[15] Education Committee on Industrial Arts, *Industrial Arts, Its Interpretation in American Schools.* United States Department of Interior, Office of Education, Bulletin 34, 1937, p. 110.

This illustration shows a workshop with several boys intensely occupied with the building of model airplanes.

Submitted by Official Information Bureau of Switzerland, 475 Fifth Ave., New York 17, N. Y. H. Pillichody, director.

— Courtesy, Photopress, Zurich

them to work; here tangible material results give evidence of technical knowledge and skill. Here is an opportunity to bring skill, knowledge and attitudes together in the development of character.[16]

Moreover, through this integration, the defects of the traditional curriculum are absent from the industrial-arts program. While the problems may still exist for the conventional subjects detached from the industrial-arts program, this program is capable of taking the lead toward exhibiting to the educational world a remedy for its present curriculum ills.

[16]Education Committee on Industrial Arts, *op. cit.*, p. 59.

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Avocational Courses in the Veterans Training Program

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Differences of opinion have arisen from time to time among representatives of the several agencies concerned with the administration, supervision, and promotion of training programs for veterans regarding the value of courses which do not have a direct relationship to the immediate earning activities of these individuals. Some contend that the intent of the several laws establishing the training programs was that of providing in the narrowest sense, for the rehabilitation of disabled veterans and for the readjustment to civilian life of the great bulk who were not disabled physically or mentally. They maintain that the paramount objective of those who appropriated the huge sums of money now being expended for training veterans was that of making them economically self-sufficient through the learning of the necessary skills, techniques, and knowledge which would make them readily employable. Therefore, they say, any course or training that does not contribute to this purpose is not sound and should not be authorized and paid for by the Veterans Administration. However, there are others who hold the opinion that the determination of whether or not a course or courses of training have any value for a veteran should depend upon how beneficially the individual and society are affected by such programs. Furthermore, these persons claim that it is not now the purpose of Congress to restrict the training to the objective of achieving immediate employability since legislation subsequent to the passage of the early laws has indicated a broadening of the thinking on the part of federal legislators with regard to this program. Thus, they hold, by the establishment of sound criteria it is possible to permit veterans to enroll in a large variety of courses which do not have an immediate bearing on their daily economic activities because at the same time their interests in so far as improving their chances for employment can be safeguarded.

In order to advance the second point of view mentioned in the foregoing, it is necessary first, to review the developments in the program as evidenced in official documents of the Veterans Administration, and second, to propose some bases for establishing criteria for judging the value of proposed courses of education or training.

What Did Congress Intend to Provide for the Veterans?

A study of certain Veterans Administration documents[1] provides some clues as to the intent of Congress in providing for the readjustment of a veteran. It is evident that the intent of Public No. 346, as originally passed by Congress, was to provide primarily for the vocational readjustment of a nondisabled individual so as to enable him to become employable and to obtain security of employment for the balance of his life. It was on that basis that Congress provided for refresher or retraining courses for persons who were over 25 years of age at the time they entered active service and further required them to submit satisfactory evidence that their education or training was impeded, delayed, interrupted, or interfered with as a result of such service. However, when Public No. 268 was passed all such restrictions were eliminated and veterans were given the right to enter into training or education regardless of age at time of entrance into active service. Furthermore, it was provided that it was no longer necessary to identify refresher or retraining courses, and the restriction that part-time courses should be continuous was removed. Certain other clauses liberalizing the provisions of Public No. 346 were also included in Public No. 268, which gives rise to the feeling that possibly Congress began to look upon the whole problem of education and training in a broader light than that in which it had been originally viewed. Public No. 679 which was passed in August, 1946, had for its major purpose the tightening up of the conditions surrounding on-the-job training and nowhere in that Act is any mention made of education of a broad nature.

[1]Instruction No. 2, U. S. Veterans Administration. Subject: "Determination of Eligibility for Education or Training, Notification to Veteran and Approved Institution, and Payments to Veteran Under the Provisions of Public No. 346, 78th Congress, Title II." Circular No. 9, U. S. Veterans Administration. Subject: "Preliminary Instructions for Instituting the Changes Authorized by Public No. 268, Approved Dec. 28, 1945, in Public No. 16 and Public No. 346, Title II." Instruction No. 8, U. S. Veterans Administration. Subject: "Application of the Provisions of the Servicemen's Readjustment Act, Title II, as Amended by Public No. 679, Section 3, Approved Aug. 8, 1946."

As further evidence of the thinking of Congress on this subject the following sentence from General Bradley's foreword to Instruction No. 8 is quoted:

"It is the intent of the law that the veteran have the right to elect his course of education or training at any approved educational or training institution at which he chooses to enroll which will accept or retain him as a *student* or *trainee* in any field or branch of knowledge which such institution finds him qualified to undertake or pursue."

It should be noted that the emphasis of this sentence is placed upon the term "student" and "trainee," and it may be assumed from that that it is important for the veteran to be in such a status if he is to qualify for the benefits established under all of the acts dealing with his readjustment. On that basis, therefore, courses of a wide variety can very well be approved as long as the veteran is actually in a learning capacity.

Should General Courses Be Approved?

However, in order to protect the interests of the veteran as well as of the government, it is essential that sound standards be established to determine whether the so-called avocational or general courses should be approved. We may begin consideration of this matter by raising questions such as the following:

a) What affects an individual's capacity to earn a livelihood?

b) Are manual skills or technical knowledge the main factors in influencing an individual's economic status?

c) What is the responsibility of the V.A. to the veteran in assisting him in his readjustment in *all* phases of life?

d) Can general college courses, such as those which are offered in a liberal arts curriculum be classified as "vocational" or can they be considered as having a definite effect on an individual's earning activities?

These questions present the issue from the standpoint of the relationship between the purely economic or making a living activities and those which deal with all other aspects of life. They point definitely to the conclusion that the individual's ability to earn and to hold a job is affected by his mental, moral (spiritual), cultural, social, and civic standards and activities as well as by the skills and technical knowledge which he possesses. Therefore, in reviewing courses of education or training to determine whether they merit approval, consideration should be given to the influence they will have in the development of proper understandings and practices along the lines mentioned before, and how conducive they will be to the making of a well-rounded, fully participating member of society. There is general agreement that institutional or on-job courses of a specific occupational nature are necessary, and the standards for judging their value have been rather definitely set. Since there is not such harmony of opinion relative to the value or necessity of courses for veterans in the fields indicated above, and there is definite need for standards upon which to base consideration, the following thoughts are submitted:

How to Judge the Value of Courses

a) *Mental attitudes and activities:* The mental factors in an individual's make-up are closely related to and may be considered as part of his nervous and emotional system. If it can be established that courses in this category aid in the development of a well-balanced and discriminating outlook upon the problems an individual faces with regard to his job, his family, his fellow workers, and society, it may be considered that they have "vocational" as well as "avocational" aspects, and that, therefore, there should be no question about their approval. Courses offered in such subjects as mental hygiene, individual and social psychology, understanding of emotional make-up, and the like, may fall within this classification. There are also types of courses which, while they do not specifically offer an opportunity to understand mental and emotional behavior, do provide some release from the tensions of life and for that reason may very well be approved under the provisions of Public No. 346. Other courses which may have a therapeutic effect are such as art metal, drawing and painting, cabinetmaking, and a wide variety of handicraft subjects which enable an individual to substitute such activities for his usual ones and thus provide an escape from pressing problems, either of an employment or other character, which may otherwise affect his efficiency in his daily work. It seems, therefore, that without too much effort, and with no stretching of the imagination, courses that fall within the range of those outlined above may very well be approved for G.I. training since they do bring about, or tend to assist in bringing about, a satisfactory readjustment of the individual.

b) *Moral attitudes and activities:* The moral aspects of an individual's life are closely akin also to the spiritual, and an understanding of the factors that affect these phases will contribute to his growth in the direction of appreciation of the principles of right and wrong in behavior, of high ideals of tolerance, religious freedom, and racial dignity. Courses in this field will be of value in assisting an individual to adopt a sound philosophy of life, which may in turn, through the participation in ethical practices, provide an outlet for surplus energy which might otherwise be used in the opposite types of activities. The following kinds of courses, therefore, may very well be authorized in order to achieve the aims just listed: ethics, religion (religious thought and practices), social relationships, philosophy, criminology and penology, social psychology, and the like. The development of pattern of proper and right conduct will influence an individual's vocational practices as much as any vocational course which he may pursue since it is important that manual skills and technical knowledge be used for the good of society rather than to its detriment. Therefore, approval may very legitimately be granted for courses of the kind named since every phase of an individual's life is affected by the ethical and moral concepts which he believes in and which he uses as guides in his everyday activities.

c) *Cultural attitudes and activities:* Cultural phases of an individual's life are those which deal with his conduct as a civilized person. As a result, courses offered in cultural subjects aid in the growth of his appreciation of the aesthetic and intellectual activities and aspects of life. These have a direct bearing on all economic and vocational activities since the development of civilized practices and customs tends to create greater wants and demands, which in turn require greater specialization in production and larger numbers of persons in the working population to satisfy those wants and demands. The following types of courses come within the category of the cultural: literature, languages, art and music appreciation, history, English usage, principles of science and development of scientific thought, principles and methods of expression, geography, and similar subjects. The development of higher cultural standards tends to make a more stable society and, in the long run, leads to greater economic security for the individual.

d) *Social and civic attitudes and activities:* Since it is obvious that in our present state of society individuals cannot act without regard for the rights and privileges of others, it is imperative that they be given an opportunity to learn about the make-up of society and about the customs and standards which govern all relationships within it. It may be argued that persons who are mature in years and who have had many experiences as a result

of war service are not in need of such knowledge and understanding. However, since society is not in a static condition it becomes evident that all individuals need some time to refresh their knowledge and to broaden their concepts of the proper social and individual relationships. From the economic and vocational standpoint, it is equally important that individuals be allowed the opportunity to learn about such elements in our society as property rights, legal foundation for social organization and civic authority, and individual rights and responsibilities within the structure of our society. All of these ideas and knowledges of social foundations, customs, practices, and thought will provide for a more effective participation by the individual veteran in the activities which are essential to the sound functioning of the entire social organization. As a result, courses such as economics, sociology in its various aspects, social customs, race relationships, political science, labor relations, problems of community development, and similar ones, might very well be approved from the standpoint that the knowledge gained from taking them will result in making the veteran a more effective citizen and producer in his community.

e) General criteria: In addition to the criteria enumerated, there are certain general ones which ought to be established when viewing a course from the standpoint of whether or not it should be approved because it has a "vocational" or "avocational" tinge. These criteria are as follows:

1. Courses should be offered in reputable, approved educational institutions.
2. They should have definite starting and closing dates, and the groups should meet regularly, or there should be regularity of reporting of progress.
3. The subject matter should have continuity.
4. Provision should be made for some form of testing to determine how much of the material presented has been assimilated.
5. Instructors should be thoroughly qualified in the subject matter taught and should be competent teachers as well.
6. The content of these courses should not be purely recreational. In other words, courses of this kind should not provide opportunity for the individual to expand his area of amusements and for that reason instruction in the playing of games of all types, in ballroom and folk dancing, gymnastics and other forms of body exercise, and the like, should not be approved under the provisions of Public No. 346.

The courses outlined in the foregoing are usually those which predominate in the liberal arts areas in colleges. These, it has been maintained, provide opportunity for mental discipline, have a broadening influence on an individual's growth and enable him to become a more effective worker and citizen. If that is the case, can we legitimately maintain that the individual who is employed, but who may not be in a full-time training status, could not also benefit from such courses if taken on a part-time basis in the evenings or during leisure periods. If we establish the principle that the kinds of courses enumerated are purely "avocational" and do not contribute to an individual's vocational improvement, we are in effect discriminating against employed persons in favor of those who have the opportunity to attend some institution of higher learning on a full-time basis. Certainly, courses should not be approved indiscriminately, but if some uniformly sound standards and criteria are applied, and each course offered is scrutinized on that basis, we cannot go wrong in allowing veterans to take them during the hours of the day when they are not working, and without regard to whether or not they have a direct relationship to the improvement of the skills and techniques required in the jobs which they hold at that particular time. We must look upon the whole problem from the point of view of the benefits to the individual as a functioning member of society and not merely from the standpoint of the employability he may achieve as the result of the training he has undertaken.

Methods of Teaching Occupational Subjects

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(Continued from page 145 of the April, 1948, issue)

The Preparation Step

The first step in the 4-step lesson is called the *preparation step*. It is a very important step, and the success of the three subsequent steps depends upon the shop instructor's ability to put the preparation step across so that its purpose is realized. This raises two logical questions as follows:

1. *What is the purpose of the preparation step?*
2. *What devices can the shop instructor use to accomplish the purpose of the preparation step?*

It has often been said that the purpose of the preparation step is *to prepare* the students to learn the lesson. This is true, but, with this knowledge at hand, the shop instructor is not much better off than he was at the beginning. True, he now knows that the step involves the preparation of the students and has *nothing* to do with the shop instructor's preparation in advance of the lesson, but he still does not know enough about the step to put it across. Even though the purpose of the first step in the 4-step lesson is now agreed upon, we, naturally, ask how this purpose can be accomplished. To answer this question we should be familiar with *the first law of learning*.

The first law of learning is often called the *law of readiness*, which is stated thus.

When any conduction unit is in readiness to conduct, for it to do so is satisfying.

When any conduction unit is not in readiness to conduct, for it to conduct is annoying.

When any conduction unit is in readiness to conduct, for it not to do so is annoying.

The law of readiness states that if the students are ready to learn, for them to learn is satisfying; and if the students are not ready to learn, for them to learn is annoying. From this it would seem to be of the utmost importance to get the students ready to learn, or, in other words, to prepare them to learn. But, how can the shop instructor prepare the students to learn or get them ready to learn? Does he command them to get ready to learn, does he tell them to get ready to learn, or does he employ some other technique to accomplish this purpose?

The answer to the foregoing question is simple. In teaching a shop lesson, the shop instructor uses the preparation step

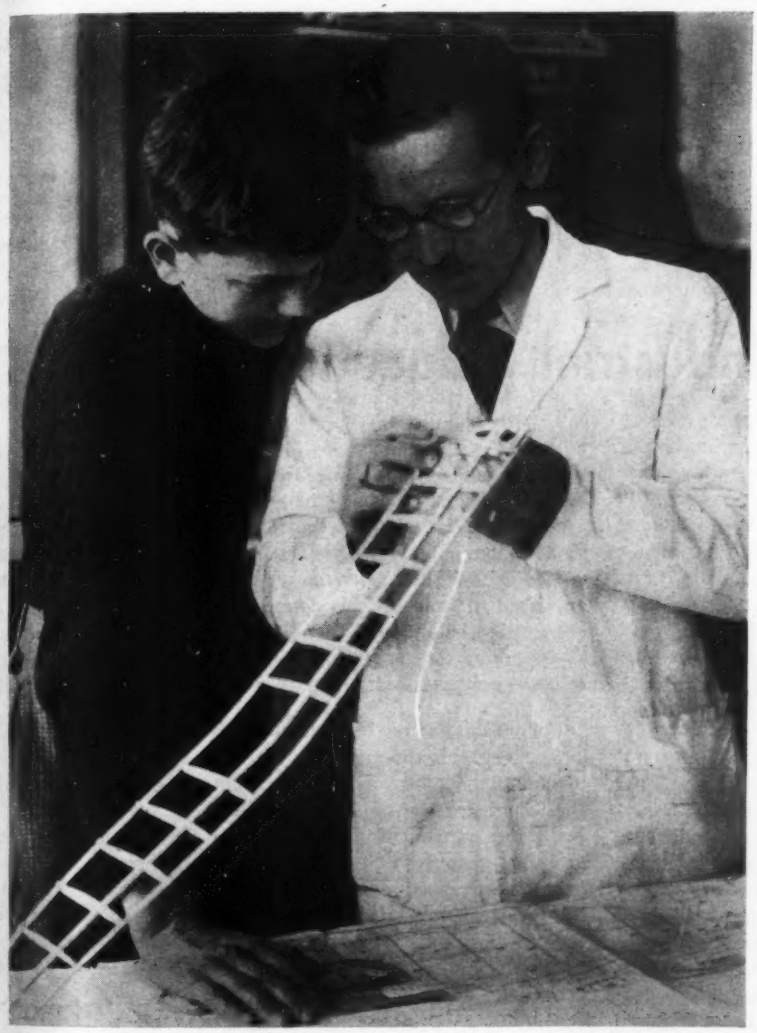
to prepare the students to learn by means of the following technique:

Obtain the attention and arouse the interest of the class.

Instead of a purpose which means little to the average instructor, we have now stated the purpose of the preparation step in terms which give a clue to the devices necessary to put the step across. If a shop instructor gains the attention and arouses the interest of the class during the preparation step, he has done a good job. Gaining the attention and arousing the interest of the class is the best way to get a conduction unit ready to conduct.

Shop lessons are taught in the shop, and the students usually assemble around the instructor. This raises an interesting question. To how many students should the shop instructor teach a shop lesson? The answer naturally depends upon a number of conditions and circumstances. In general, the shop instructor should not attempt to teach a skill to more students than he has work stations available, so that each student can apply immediately what has just been taught. Teaching a shop lesson to large groups is not sound teaching. It can only result in confusion in the minds of many students, scrap and spoiled work, and students running to the instructor for additional help. When groups are too large the students are usually crowded, some of them cannot see very well, and others may be back of the instructor. All this is an ideal setup for those students who like to indulge in horseplay, or who like to loaf through the shop lesson without doing too much thinking. Under these circumstances, it is almost impossible to obtain the attention and arouse the interest of many members of the class. If the shop instructor, under these conditions, goes through all the motions required in the preparation step, attention is not obtained and interest is not aroused with the result that the purpose of the preparation step is defeated.

To overcome this condition, the shop instructor should be sure that the class assembles in the shortest possible time and with the least possible commotion. Then, a hurried check should be made to be sure that all can see, and that those who like to indulge in horseplay are separated and in front of the instructor. To remedy such a situation, the class assembly around the machine should be supervised until the class realizes that the instructor will not tolerate a haphazard assembly. This cannot be accomplished in several lessons. It will take time because the students are developing a habit, and during the period of habit development, the shop instructor should not relax his vigilance.



Model airplane sport fascinates Swiss youth

The study and building of model airplanes has been seriously pursued by Swiss youth for a number of years and to fly these models has become a much enjoyed, yet serious sport. Construction of model airplanes improves technical draftsmanship, also knowledge in mathematics, physics, meteorology, and geography. This pastime improves at the same time the skill in the use of the various materials necessary for model airplane building.

It has been found that a group of Swiss youth working together on model airplanes in a workshop will quickly cultivate a sense for discipline and comradeship. To later fly the models which they constructed in the great outdoors is an eagerly anticipated and glorious experience. It may prove to be the beginning of a career as aviator or airplane builder.

This photograph shows a teacher explaining a problem to a pupil.

Submitted by Official Information Bureau of Switzerland, 475 Fifth Ave., New York 17, N. Y. — H. Pillichody, director.

— Courtesy, Photopress, Zurich

Assembling at the Machine

The assembly around the machine is a part of the preparation step, and it should receive the same emphasis as the remainder of the step. No one can deny the fact that it is easier to obtain the attention and arouse the interest of a shop class after an orderly assembly around the machine than it is after a disorderly assembly.

Since we have agreed that the purpose of the preparation step is to prepare the students to learn and since the shop instructor must gain the attention and arouse the interest of the students to accomplish this purpose, we next list the methods available to the shop instructor to put over the preparation step.

There are *five methods available to the shop instructor to put over the preparation step.* They are as follows:

1. *Look over class and make a few pertinent remarks on the importance of the lesson.*
2. *Use an illustration.*
3. *Tell a story or incident related to the lesson.*
4. *Use question and answer technique.*
5. *Put on a demonstration.*

In teaching a shop lesson, the instructor, first, supervises the assembly of the class around the machine or bench. Then, he continues with the preparation step (class assembly is part of the preparation step) using one of the foregoing methods to put the step across. The method chosen must be one that will gain the attention and arouse the interest of *all the members of the class.* Furthermore, it must be one that will *hold the interest of all the members of the class.* Then, again, it must be one that will permit the shop instructor to *develop the step up to a climax. This climax comes at the end of the step, and it is called the J.O.P.* (jumping off point) by Charles R. Allen in his book, *The Job, the Instructor, and the Man.* The J.O.P. is a point in the preparation step where the shop instructor has *aroused the maximum interest of all the students,* and hence, the point where the shop instructor should *stop* preparing the students to learn. It is also the point where the instructor should start the next step in the lesson, the presentation step.

Since the preparation step should build up a climax, the shop instructor should be on the alert so that it is not an anti-climax for some students. The length of time required to gain the attention and arouse the interest of the class will vary with the *instructor,* the *class,* and the *title of the lesson.* In fact, if three minutes are required to prepare one class for a certain lesson, five minutes may be required for another class; and if three minutes are required for one half of a class, five may be required for the other half of the class. As a result, in attempting to accomplish the purpose of the preparation step, *some members of the class may be underprepared and others may be overprepared.* Herein lies the danger of a preparation step whose content and length are predetermined. When the content is predetermined, the shop instructor must *observe its effect upon the class* and bring the step to a climax when he feels that the class is ready to learn; that is, when he has gained the attention and aroused the interest of the members of the class.

(To be continued)

Some Leaders in Industrial Education

(Runkle — Concluded)

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(Continued from page 193 of the May, 1948, issue)

Early Life

John Daniel Runkle was born at Root, N. Y., October 11, 1822, and died at his summer home in Southwest Harbor, Me., July 8, 1902, at the age of 79 years and nine months.

He spent his early life on a farm with very inadequate opportunity for securing an education. Until the age of 16 years he engaged in work on the farm during the summers and attended district school during the winter months. At about the age of 16 years he attended a private school for three months and for the first time became acquainted with mathematics higher than simple arithmetic. Discovering an interest in this field, he continued his studies unaided and in ten years acquired a mastery of the higher branches of mathematics, at the same time working on the farm and teaching in the district school. He also taught three years, 1844–47, in the Academy, at Onandaga, N. Y. During this period he carried his study of mathematics through the requirements for college entrance, and then through the courses offered in the colleges of that day.

In 1847, at the age of 25, he entered college, enrolling in the recently opened Lawrence Scientific School of Harvard University. In the Harvard Catalogue of 1848–49, Runkle's name appears alone under the classification, "student in mathematics."

He was a member of the first graduating class, 1851, of Lawrence Scientific School, receiving the degree of bachelor of science, and at the same time, "for high scholarship," the honorary degree of master of arts.

Shortly after entering Lawrence, Runkle became interested in astronomy, and in 1849 he secured a position as assistant on the staff of the *American Ephemeris and Nautical Almanac,* published in Boston. This connection he maintained until 1884.

In 1858, he founded the *Mathematical Monthly,* and served as its editor for three years. However, this journal was forced to cease publication at the outbreak of the Civil War in 1861.

Founding of the Massachusetts Institute of Technology

At about this time a major real estate project was under way involving the filling in and reclaiming of the tidal lands along the Charles River and the development of what is now the Back Bay section of Boston. Runkle became associated with a group of men who began to work on a proposal to establish here an advanced educational institution of some type as an improvement for this part of the city. The movement gained momentum, and after repeated efforts state assistance was finally secured, and the Massachusetts Institute of Technology opened its doors in the spring of 1865.

Runkle, as professor of mathematics, was a member of the original faculty of ten, including the president, W. B. Rogers. Prior to the opening of the institute, Runkle became a member of the committee, organized in February, 1859, consisting of representatives of "Associations of Agriculture, Horticulture, Art, Science, and Various Industrial, Educational, and Moral Interests of the State," which sponsored the project.

In due time, Runkle was appointed the first secretary of the institute, and in this capacity, in April, 1862, he notified Professor Rogers of his election as president of the Massachusetts Institute of Technology, to serve until the first annual meeting of the Corporation, at which time the administrative officers for the ensuing year were to be elected. At this first annual meeting, Runkle was elected Publication's Committee chairman.

After three years of exacting labor, President Rogers became ill and resigned in 1868. Professor Runkle, who had had a prominent part all through the planning stage, and had served as trusted adviser and assistant to President Rogers ever since the institute opened, was appointed acting president upon President Rogers' expressed wish. In 1870 Runkle was made president. During this period, 1868–70, Charles William Eliot (1834–1926), who had served as professor of mathematics and chemistry in Lawrence Scientific School, 1858–63, and as professor of chemistry at Massachusetts Institute of Technology, 1865–69, was elected president of Harvard University, and served in that capacity 40 years, 1869–1909.

Achievements as President of MIT

It is not necessary for the purposes of this sketch to attempt a complete account of Dr. Runkle's achievements as president. I will mention briefly only a few of the more original and significant events.

Because of my own belief in the educational and developmental values of the field excursion, I read with considerable interest the story of what Dr. Runkle did along this line. Under his leadership the first field excursion at MIT was conducted in the summer of 1872, for students in civil engineering. A study was made of railroad and highway bridge construction in a number of centers.

Another significant innovation was the establishment of summer schools of engineering. The first of these was organized in the summer of 1871. In 1870 President Runkle visited St. Louis, and there made the acquaintance of Dr. William G. Eliot (1811–87), the founder of Washington University. From its establishment in February, 1854, Eliot was president of the board of trustees, 1854–70; acting chancellor, 1870–72; and chancellor from 1872 until the time of his death in 1887.

Dr. Runkle was Dr. Eliot's guest on a trip to Colorado, where they spent some time in the mountains. Dr. Runkle was greatly impressed by what he observed of the achievements of engineers in the rugged terrain, in the building of bridges, tunnels, and mountain highways, and in mining operations. He saw what a wonderful experience it would be for the engineering students in an eastern school to spend some time, as he had done, in the Rocky Mountains.

With the aid of other members of the faculty plans were made for a summer school of mining engineering in the summer of 1871. The party consisted of five professors and 17 students, in addition to President Runkle. Leaving Boston soon after the close of school in June, they visited Iron Mountain and Pilot Knob in Missouri; four important mining centers in Colorado, two in Utah, two in Nevada, and one in California. The party divided in Salt Lake City, one section going to Wyoming. The other, including Dr. Runkle, spent some time in San Francisco.

In San Francisco, two laboratories for the testing and reduction of gold and silver ores were studied. The practical result of these trips and other investigations was the installation of the mining and metallurgical laboratories at Massachusetss Institute of Technology.

I have already referred to the MIT encampment in Philadelphia in the summer of 1876, and the thorough study made of the exhibits at the centennial exposition.

The biographical sketch which appeared in *The Technique*, 1900, included a summary of the developments at MIT which occurred during Dr. Runkel's presidency. From this summary I have selected the following:

Adaptation of the Russian system of analysis of the mechanic arts, and the resultant plan of shop organization and methods of instruction, to American conditions. Both Dr. Runkle and his biographers seem to have regarded this as one of his greatest contributions.

Establishment of the School of Mechanic Arts on the secondary school level, with the aim of making the benefits of "manual education" available to all boys, but especially to those who may not be able or fitted to enroll in the engineering college.

Establishment of a complete series of well-equipped laboratories, including mining engineering, mechanical engineering, mineralogy, biological sciences, industrial chemistry, physics.

Inauguration of new courses in metallurgy, biology, industrial chemistry, and physics.

The admission of women students.

Identification of the Lowell School of Design with the institute.

Provision for physical education, gymnastic training, and military drill.

Provision of dining-room and lunchroom facilities for students and members of the faculty. "I am fully satisfied that it is the duty of the institute to maintain this restaurant as a means of promoting the health of students and of reducing their necessary expenses."

Establishment of summer schools of engineering and the conduct of field excursions.

A Pioneer in Engineering Education

Several years later, General Francis A. Walker, who was president of MIT from 1881–97, wrote of Dr. Runkle's achievements:

"Everything he did was new — essentially first. There were no precedents in the United States, and, with the Russian exception, no precedents anywhere. Everything he did succeeded. . . .

"Today, let one stand in the institute and face whatever way he will, something there is which will suggest to him the marvelous origination of that period, and will impress upon him the vital importance of the work of the Runkle presidency."

Honors

In addition to the B.S. and A.M. degrees awarded by Harvard University in 1851, Hamilton College, Clinton, N. Y., conferred upon him the degree of Ph.D. in 1867, and Wesleyan University, Middletown, Conn., the degree of LL.D. in 1871.

I have previously mentioned his work on the *Nautical Almanac*, 1849–84, and his editorship of the *Mathematics Monthly*, 1858–61. He was author of *New Tables for Determining the Values of the Co-efficients in the Perturbative Function of Planetary Motion;* a textbook entitled, *Elements of Plane Analytic Geometry*, published in 1886; also, *The Manual Element in Education*, which appeared in the 41st Annual Report of the Board of Education, Commonwealth of Massachusetts, 1876–77, and later was republished in pamphlet form. A second paper on the same subject was published by the board in the 45th Annual Report for 1880–81. As chairman of the committee, he wrote the "report of the Committee on Industrial Education," published in the *Proceedings* of the 54th Annual Meeting of the American Institute of Instruction, 1883.

Following his return from the centennial exposition in Philadelphia, he prepared a report entitled, *The Russian System of Shopwork for Engineers and Machinists*, which was published by the Massachusetts Institute of Technology, 1876.

He summarized the results of his studies and observations in industrial and other schools in Europe in an address entitled, "Technical and Industrial Education Abroad," before the Society of Arts, Boston, April, 1881.

Last Years

In September, 1880, at the age of 58, Dr. Runkle returned from Europe much improved in health, and resumed his former position as professor of mathematics. "In this work he found his highest usefulness and most congenial vocation, and continued in it for 21 years." In the fall of 1901, at his own request, he was assigned part-time duties. Before the close of the school year, in the spring of 1902, he was obliged by failing health to give up his teaching entirely. He died at Southwest Harbor, Maine, July 8, 1902, at the age of 79 years and nine months.

In conclusion, as suggested by his biographer, Tyler, while it is true that others have taken a more directly prominent share in the introduction of mechanic arts or manual training in primary and secondary schools, nevertheless the experiment initiated by John D. Runkle in the School of Mechanic Arts, in Boston, in the fall of 1876, was a genuine pioneering achievement, and in its time it had wide influence and many imitators.

References

In addition to other sources I have made particular use of the following references, the first two through the courtesy of a loan from the library of the Massachusetss Institute of Technology:

Biographical sketch of John Daniel Runkle, in *The Technique*, Vol. 15, 1900, yearbook of the junior class (class of 1901). Published by the Massachusetts Institute of Technology, Cambridge, Mass.

H. W. Tyler, *John Daniel Runkle*. Reprinted from *The Technology Review*, Vol. 4, No. 3. Published by G. H. Ellis Co., printers, 272 Congress St., Boston, Mass., 1902, 32 pp.

Charles A. Bennett, *History of Manual and Industrial Education, 1870 to 1917*, Chap. 9, pp. 310-346 (Peoria, Ill.: The Manual Arts Press, 1937).

(To be continued)

New Technique in Teaching Current Events

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In recent years the word *all* has received marked attention by American educators. The watchword, "Education for *all* of the children of *all* of the people," has prompted some to add: "That which the wisest parent wants for his child, *all* parents should strive to obtain for their children."

Teachers in their classrooms, too, have diligently proceeded to devise ways and means of stimulating participation of *all* pupils in classroom activities.

The use of a hand microphone and a loud-speaker is the outgrowth of a desire on the part of one social studies teacher to stimulate *all* pupils in the class to take part in the discussion of current events. Experience has proved that far too often slower pupils are left behind by brighter ones who tend to dominate discussion lessons.

Procuring the materials for the lesson employing the audio aid entails no real difficulty. In every class or school are found pupils whose radio or electrical hobbies can be turned to practical value. The ever willing school shop may be enlisted to make a loud-speaker. Current events, periodicals, newspaper clippings are readily available. Current events articles selected by the teacher in advance for special treatment during the lesson may serve as one of several possible sources of subject matter.

The current events lesson employing the hand microphone and loud-speaker may be divided into five parts:

1. *Teacher preparation:* Teacher selects material in terms of pupil interest and difficulty. Teacher prepares assignment of topics to be made to groups and to individual pupils.

2. *Introduction:* Teacher presents aims of the lesson, outlines procedures, provides materials for lesson.

3. *Pupil preparation:* Pupils scan article for general understanding. Pupils form groups to work on assignments. Individual members of each group prepare topics assigned for presentation.

4. *Presentation:* Student leader announces topics to be presented over loud-speaker, passes hand microphone to pupils, and maintains continuity as the material is presented. Each pupil announces his name and his topic, and makes his contribution from a sitting position.

5. *Summary:* General discussion follows the presentation. Pupils are encouraged to make corrections, or to contribute additional information.

The current events lesson using the hand microphone and loud-speaker has been found to have many advantages. Among the outcomes and psychological considerations are:

1. It is a way of stimulating *all* pupils in a classs to make contributions to class discussion.

2. By working in small groups it gives pupils an opportunity to appreciate cooperative achievement and to realize the interdependence in modern society.

3. It eliminates the awkward procedure often associated with the traditional question-response form of recitation. A pupil's report is made from a natural sitting position, and the contribution is amplified so that all pupils in the room experience no difficulty in hearing him.

4. To newcomers, especially in the electrical course, it stimulates interest in the use of mechanical devices; and it creates a respect for the technical people who develop and control such devices.

5. It makes possible a desirable learning situation in which the students carry on the lesson while the instructor directs progress from the background.

6. It instills in pupils a respect for the teacher who uses modern techniques in teaching.

7. Used at the beginning of new semesters, it has been found to be a satisfactory means of eliminating the tenseness that prevails among pupils in a new environment; the microphone serves to bridge the interval of adjustment to a new situation.

8. The experience of talking over a microphone and hearing his own voice coming from a loud-speaker, partially satisfies the pupil's desire to "talk over the radio."

9. It helps to "break the ice" for the slow pupil who is traditionally left behind by brighter pupils who dominate discussion lessons.

10. It provides a close integration between English and social studies; silent reading of articles for the purpose of noting details; organization of facts for oral reporting; poise, mannerisms, diction, and other factors in oral reporting; evaluating and criticizing oral reports, etc.

Auditory aids are not substitutes for teacher instruction. The teaching aid described should not be used as an end in itself.

"Upon the sure foundation of a sound and comprehensive knowledge of the teaching problems in any instance, the teacher will select methods, devices, and aids to learning which, in his best judgment, will give superior results." — *Harold Benjamin.*

Closing the Shop at the End of the School Year

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There are two very definite problems that confront the woodwork instructor during the last weeks of school. One of these is, that some of his students finish their projects and run out of work before the dismissal time. The other problem is that some of the students have more than they can accomplish by the time of the last day and hour of school.

Failure by the instructors to solve the first problem mentioned will result in idleness among students, confusion during class hours, general letdown of attitude, poor attendance, loss of materials and tools, and sometimes loss of control of the classes altogether. Worst of all there will be a growing student concept that "We are not doing anything now in woodwork, so why be concerned. . . ." This concept is very detrimental to the permanent industrial-arts program in any school.

Failure on the part of the instructor to solve the second problem mentioned will result in: students taking unfinished projects out of the shop, or leaving unfinished and unpaid for projects in the shop. There also will be dissatisfied students and parents, a shop cluttered up for the summer with unfinished projects (often unfinishable and unsalvageable), financial loss to the shop for materials used in incompleted projects, loss of interest on the part of students, and worst of all, the concept on the part of students that a project may be started and not carried through to completion.

In addition to these problems, the instructor must also accomplish the following if he finishes his job at the close of the school year. He must prepare his supply-on-hand inventory, prepare his equipment inventory, place his equipment and supplies in adequate storage for the summer, collect money for all supplies used, prepare all reports required of him by his students and his superiors, request needed repairs, and request supplies for the subsequent year. He should leave his shop with the appearance that he carried the year's work through to completion. All drawers, cabinets, and lockers must be cleaned out, and no projects either finished or unfinished should be left in the shop after school closes. A collection of projects of any sort left in the shop is a reflection on the industrial-arts instructor and his program.

Now, how is the instructor going to get all of this done? The writer has the following suggestions which will go a long way toward accomplishing the above mentioned.

1. Start making plans for closing in ample time before the closing date by placing limitations on the type and kind of projects approved.

2. Make all students understand that to finish the year in good standing a student must finish his project, keep himself busy, pay for all materials used, and take his projects out of the shop.

3. Introduce small fill-in projects that can be finished in the available time as the year's end approaches.

4. Open the shop outside of school hours so that those students who need extra time and extra help will have it (after school, at night, and on Saturdays).

5. Check daily on large projects that are likely to require extra effort.

6. Provide all necessary materials when needed.

7. Figure up the cost of each project, post the list where all students may see it at least two weeks in advance of the closing date. Be sure that every student knows exactly what his completed project is costing.

8. Salvage materials in unfinished projects if any are left by students withdrawing during the year, so as to make this material available for future use.

9. In the event that a student does withdraw and leaves a project in the shop, the instructor should at once get in touch with the parents and work out a plan for the disposition of the project. Most parents will be glad to call for and pay for a piece of work made by their own son or daughter.

10. Announce the sale at cost of materials, any projects that may be unclaimed by students or parents. Students will readily buy projects that are useful, well made, and well finished.

11. Set a deadline for closing the shop and be sure every student knows, well in advance, what that date is.

12. In a limited number of cases students who have finished their own work may be called upon to help others. This plan must be used with caution and under close supervision.

13. The instructor is justified in requiring students to help with such jobs as scraping and sanding bench tops, lubricating, cleaning, and repairing equipment.

14. By all means the instructor must not allow the concept to develop that "school is too near out to do anything more."

The writer has found that the foregoing suggestions work very well. They require patience, time, and effort, but they yield dividends in the long run. The student who has a good, well-made, well-finished project to take home at the end of the year, even though he has had to spend many hours outside of the regular school time in order to get it finished, will prove to be an ardent supporter of the industrial-arts program, while the student who ran out of work and wasted several hours before the closing date will not be well impressed with the value of the industrial-arts program.

The annual farm accident report shows the following:

1. Farm home deaths totaled 6500, with approximately 1,000,000 nonfatal injuries.

2. The motor vehicle increase from 5500 to 7000 was a 27 per cent jump.

3. The total of 4500 farm work deaths was 27 per cent of the nation's occupational death total for 1946.

4. Agriculture, with more workers than any other industry, had a death rate per 100,000 workers of 54, as compared with the all-industry rate of 31.

5. Public nonmotor vehicle deaths, such as drownings, took the lives of 1500 farm residents, an increase of 7 per cent over the preceding year.

6. Fire destroyed farm property valued at $90,000,000 in 1946, one sixth of the national fire loss. — National Safety Council.

Industrial Arts and Vocational Education

John J. Metz, Editor

THE END OF THE SCHOOL YEAR

H. A. Allender's article entitled "Closing the Shop at the End of the School Year" on page 225 of this issue gives very fine directions for the teacher who is closing up his shop for the first time. As a matter of fact the suggestions contained in that article can well be used as a check list by any shop teacher, no matter how many years he has been teaching.

It is well to remember that the closing up of school, and the manner in which a teacher takes care of the items that need his attention, label him, in a way, as to his value as a teacher. Such jobs as storing the hand tools, supplies, instruments, books and pamphlets, applying rust protection to machines, straightening out the financial accounts with the office, and leaving properly tagged room and cabinet keys at the office, plus his summer and home address so that he can be reached during the vacation period if that be necessary, are an indication from which the trustworthiness of an instructor may be determined.

At any rate, whether you will or will not return next year to the shop you are teaching in at present, close it up in a way that will be a credit to you.

A NEW MATHEMATICAL ROBOT

A new calculating machine which solves difficult problems in the fields of electrical circuits, machines of various kinds, applied mechanics, hydraulics, and heat has been built by the Westinghouse Electric Corporation. It is installed in a laboratory at East Pittsburgh, Pa.

Lest wrong impressions might be set up in the minds of some who do not read this to the end, it is well to say right here that arithmetic and mathematic texts, tables of logarithms and trigonometric functions and slide rules should not be thrown away just yet. They will all continue to be used for many years, in spite of this new device.

The new robot, called the Anacom, solves problems in a way that does not involve the rules of formal mathematics. To solve problems involving the design of a given machine, electrical devices such as capacitors, resistors, and inductance coils are arranged in such a manner that they behave electrically the same as the real machine does mechanically. The real forces in the machine are represented by electrical voltages or currents which can be measured accurately at any point by connecting leads from the chosen point to a cathode-ray oscilloscope. In this way a diagram can be traced on the oscilloscope screen which shows the magnitude and wave shape of the corresponding quantity in the actual machine. This method is very flexible and no matter how complex the forces are, the electrical analog will permit them to be studied, and, if necessary, the revision of their behavior in an actual machine may be repeated over and over again.

A moment's consideration shows that this new robot cannot be assembled in a little box so that it can be carried from place to place. As a matter of fact, the Westinghouse Corporation set aside a separate room for this electrical calculator.

Cabinets, along one wall of this room, contain the parts of this new mathematical analyzer. The control desks are in the middle of the room, and the electrical elements used to build up the analogs of the physical machines are housed in other cabinets between which plug boards have been placed so that the various elements can be connected at will. Voltages for simulating the forces applied to the machine are provided from two cabinets.

Of course, there is much more to this mathematical robot than is evident from this short description. Suffice it to say that this wonderful device was developed by men who attended grade and secondary schools not so many years ago. Some of them attended classes taught by teachers who are still teaching. Does that mean something to us who are now teaching those who are to continue where the originators of this almost miraculous mathematical robot stopped? Are we fully realizing what is demanded of our product — the industrial wizards of the future? How can some of us then be satisfied with following the same routine year after year, using the same outline of instruction, the same lesson sheets, the same projects, the same related subjects material?

Isn't it about time to change?

THAT DREAD SPECTER — POLIO

While the death rate for infantile paralysis is on the decline, and while over 50 per cent of those afflicted recover completely, nevertheless, the fact remains that 15 to twenty per cent of the victims are left seriously crippled or die from the effects of the dread affliction, and that generally speaking, infantile paralysis is on the increase in the United States.

The medical profession is to be complimented that they have made such progress in combating this disease. Great praise also is due to the National Foundation for Infantile Paralysis, Inc., 120 Broadway, New York 5, N. Y., for their valiant fight against polio.

Whether or not the infantile paralysis attack will be very severe this year remains to be seen, but it is well to apply all of the preventatives and precautions possible, and thus curb the spread of the disease as much as possible. Since these epidemics usually occur during the months of June to September, it is necessary right now to impress on your students that they should carefully avoid chilling and overtiring themselves; that they should not swim or bathe in polluted waters; that they are to be careful to wash their hands before eating; and that all food should always be covered so that the flies cannot get at it.

It is also wise to warn parents that if infantile paralysis is occurring in one's own or neighboring communities to keep their children in their own normal environment, and away from theaters, picnics, beaches, and other public gathering places; also, that they be guided by their doctor concerning the advisability of tonsil and adenoid operations.

Remember also that local infantile paralysis chapters are ready to aid every polio sufferer and that their services should be appealed to at once, since prompt action is the first step to recovery.

All should help to reduce the spread of infantile paralysis. Let us, the teachers of industrial arts and vocational education, do what we can to help our students avoid the suffering that accompanies an attack of polio.

Course Outline For Related Subjects in Carpentry

CARLTON DWIGHT
Principal, Vocational School
Binghamton, N. Y.

(Continued from page 189 of the May, 1948, issue)

2. The use of layout and measuring tools
3. Trade method of figuring amount of labor

C. Trade information
1. Building codes
2. Use of builders' handbooks

D. Special tools, equipment, and materials
1. Stock sizes of materials for plaster grounds, furring, and backing

E. Trade processes
1. Method of installing furring strips
2. How to install grounds — base grounds, grounds around openings, special grounds for chair rails, picture molds, etc.
3. How to provide backing at wall intersections
4. How to install corner beads
5. How to install wood lath
6. How to install metal lath
7. How to install gypsum board lath

F. Blueprint reading and sketching
1. Essentials
2. Reading plans and details of plaster grounds

G. Safety and accident prevention
1. Safety rules in the use of tools and materials

Flooring

A. Trade science
1. Types and materials — softwoods, hardwoods

B. Trade mathematics
1. Estimating the amount of lumber in flooring
2. Trade method of figuring amount of labor

C. Trade information
1. Building codes
2. Use of builders' handbooks

D. Special tools, equipment, and materials
1. Standard sizes of flooring
2. Plug cutter
3. Forstner bit

E. Trade processes
1. How to prepare the subfloor surface
2. How to lay tongue and groove flooring
3. How to lay ship lap and splined flooring
4. How to lay butterfly joint and planked or pegged floors
5. Surfacing finished floors

F. Blueprint reading and sketching
1. Reading plans and details of flooring
   a) Taking off dimensions and material specifications

G. Safety and accident prevention
1. Safety rules in the use of tools and materials

Interior Trim

A. Trade science
1. Types and characteristics of window sash—basement sash, double hung sash, casement sash, sliding sash, storm sash
2. Description of and information concerning door backs and door jambs
3. Description of and information concerning types of door trim
   a) Plain door casing
   b) Cabinet head casing
   c) Molded casing
   d) Backhand casing and doorstops
4. Description of and definition of members used in window trim
5. Description of baseboards — plain, molded
6. Description of wall panels and ceiling trim — wall battens, ceiling molding and trim
7. Description of and types of kitchen cabinets
8. Description of and types of clothes and linen closets
9. Description of and types of bookcases and mantels
10. Description of and information concerning finish stairs
    a) Stairs built on carriages
    b) Stair built with housed stringers
    c) Stairs built with housed and open stringers
    d) Newel posts, balusters, and handrails
11. Description of and information concerning interior and exterior doors
    a) Types and sizes of doors
    b) Standard types of doors sticking and panels
12. Description of and information concerning finish hardware
13. Materials used for interior trim—wood, hardware

B. Trade mathematics
1. Problems on stair construction
   a) Length of stair stringers
   b) Total rise and run
   c) Determining the rise and run where head room is limited
2. Methods of estimating for materials needed
3. The use of layout and measuring tools
   a) Use of the steel square in stair construction
4. Trade method of figuring amount of labor

C. Trade information
1. Building codes
2. Use of builders' handbooks

D. Special tools, equipment, and materials
1. Stock sizes of lumber used for interior trim
2. Stock sizes of prefabricated trim
3. Standard sizes of hardware

E. Trade processes
1. How to fit and hang window sash — basement sash, double hung sash, casement sash, sliding sash, storm sash
2. How to build and install door jambs and bucks
3. How to fit and install door casings
   a) Plain door casing
   b) Cabinet head casing
   c) Back band and molded casing
4. How to fit and apply window trim
5. How to install baseboards
6. How to install wall panels and ceiling trim
7. How to build and install a kitchen cabinet
8. How to build interiors of clothes and linen closets
9. How to build a recessed niche, corner cabinet, and mantel shelf
10. How to build and finish stairs
    a) Stairs on carriages
    b) Stairs built with housed stringers
    c) Stairs built with housed and open stringers
    d) Newel posts, balusters, and handrails
    e) Basement stairs
11. How to fit a door
12. How to apply finish hardware

F. Blueprint reading and sketching
1. Essentials — plan and details, sections
2. Reading plans and details of interior trim
   a) Taking off dimensions and material specifications
3. Making *on the job* sketches of details of interior trim

G. Safety and accident prevention
1. Safety rules in the use of tools and materials

Interior Wall Board

A. Trade science
1. Types and characteristics of wallboards — fiber, plaster, hard boards, plywood
2. Methods of manufacture of wallboard
3. Selection of materials

B. Trade mathematics
1. Estimating quantity of materials needed
2. Trade method of figuring amount of labor

C. Trade information
1. Building codes

D. Special tools, equipment, and materials

1. Stock sizes of wallboard

E. Trade processes
1. How to apply fiber and decorative insulating boards
2. How to apply plaster boards
3. How to apply hard board and plywood
4. How to apply matched wallboards

F. Blueprint reading and sketching
1. Essentials
2. Reading plans and details of construction requiring wallboard
   a) Taking off dimensions and material specifications
3. Making *on the job* sketches of wallboard construction

G. Safety and accident prevention
1. Safety rules in the use of tools and materials

Course: Building Maintenance and Repair

Shoring, Needling, Underpinning, and Bracing

A. Trade science
1. Strength of materials — timbers, steel beams, buck walls
2. Lifting power of various type jacks
3. Distribution of forces by supports
4. Purpose of shores, underpinning, needling, bracing
5. Shoring trenches

B. Trade mathematics
1. Trade method of figuring the amount of materials and labor

C. Trade information
1. Building codes

D. Special tools, equipment, and materials
1. Screw and hydraulic jacks
2. Wedges
3. Stock sizes of materials used

E. Trade processes
1. Placing footings for shores
2. Shoring walls in alterations
3. Shoring walls for bracing purposes
4. Using hydraulics and screw jacks
5. Methods of supporting walls with steel girders and wooden beams (sometimes called needling)
6. Underpinning walls without needling
7. Bracing walls

F. Blueprint reading and sketching
1. Making *on the job* sketches of various methods in:
   a) Shoring up walls
   b) Footing for shores
   c) Needling
   d) Bracing walls

G. Safety and accident prevention
1. Safety rules in the use of jacks
2. Safety rules in the handling and use of timbers

Repairing and Remodeling Existing Buildings

A. Trade science
1. Fundamentals of remodeling
   a) What constitutes remodeling?
   b) Is remodeling worth while?
   c) Remodeling requirements
2. Selection of materials

B. Trade mathematics
1. Trade method of figuring amount of materials and labor

C. Trade information
1. Building codes
2. Use of builders' handbooks

D. Special tools, equipment, and materials
1. Standard specifications for materials used in remodeling

E. Trade processes
1. Methods of remodeling — exterior, interior

F. Blueprint reading and sketching
1. Essentials of reading architectural plans
2. Reading plans, details, and specifications for remodeling
3. Making sketches for remodeling
   a) How to select architectural types

G. Safety and accident prevention
1. Safety in the use of tools and materials

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Our country is still young and its potential is still enormous. We should remember, as we look toward the future, that the more fully we believe in and achieve freedom and equal opportunity — not simply for ourselves but for others — the greater our accomplishments as a nation will be. — *Henry Ford II.*

"Reading makes a full man — meditation a profound man — discourse a clear man." — *Benjamin Franklin.*

Teaching Materials For Industrial Education

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(Continued from page 158 of the April, 1948, issue)

CHARTS AND POSTERS

Drafting

Eagle Pencil Co., 703 E. 13th St., New York 9, N. Y.
Prismacolor Pencil — 36 colors — color chart and any one pencil — 10 cents
Turquoise Drawing Pencil — 17 degrees — 6B to 9H — 1 piece any two degrees — 10 cents

Eberhard Faber Pencil Co., 37 Greenpoint Ave., Brooklyn 22, N. Y.
Standard Woodworking Joints
Basic Standard in Mechanical Drafting
Standard Symbols in Electronic and Radio Engineering
Standard Symbols for Plumbing, Piping and Valves
Basic Principles in Industrial Design
Elements of Modern House Design
Standard Technique in Forming Letters
Color Chart, "Art Versatility," showing 24 Mongol colored pencil colors and explaining various techniques in applying them

Electrical and Communications

Du Mont Laboratories, Inc., Allen B., Passaic, N. J.
The Cathode-Ray Tube (wall chart)

Eberhard Faber Pencil Co., 37 Greenpoint Ave., Brooklyn 22, N. Y.
Standard Symbols in Electronic and Radio Engineering
Standard Symbols for Wiring Plans

Edison, Inc., Thomas A., West Orange, N. J.
Wall Chart of Cutaway Cell

Ohmite Manufacturing Co., 4835 Flournoy St., Chicago 44, Ill.
Ohm's Law Calculator — 25 cents each; special price in quantities
Ohm's Law Chart
Parallel Resistor Chart
Charts (set of 2) showing cutaway views of two common types of Ohmite Rheostat and typical wirewound resistor
Graphical Wall Charts (set of 2). One shows graphical solutions of Ohm's Law problems; the other shows graphical solutions to problems involving resistors in parallel

Weston Electrical Instrument Corp., Newark 5, N. J.
Instrument Mechanism Wall Charts

Handcraft

Bicycle Institute of America, Inc., 122 East 42nd St., New York, N. Y.
Safety Posters

Columbian Rope Co., Auburn, N. Y.
Columbian Knot Chart, Advertisement 479

Le-Page's, Inc., Gloucester, Mass.
Do's and Dont's for Gluing
Glue Facts

Plymouth Cordage Co., North Plymouth, Mass.
Kinds of Knots

Industrial and General

Allied Chemical and Dye Corp., Barrett Division, 40 Rector St., New York 6, N. Y.
Products Derived from Coal

American Technical Society, 850 East 58th St., Chicago 37, Ill.
Upgrading Charts

Bausch & Lomb Optical Co., Rochester 2, N. Y.
Demonstration Material:
Newton's Rings Demonstrator and Booklet (L-55) — $1
Optical Glass Ingredients and Sample Lenses (BB-226) — $2
Multiplex Mapping Equipment Demonstration Folder (E-14 ins.)
Eye Plaques — Cross Section of the Eye — $2.10; *Eye Muscles* — $2.10
Wall Charts:
Path of Light through a Microscope (D-136)
Path of Light through a Colorimeter (H-224)
Path of Light through an Abbe Refractometer (D-225)
Path of Light through a Dipping Refractometer (H-228)
Path of Light through a Quartz Monochromator (D-226)
Notebook Chart:
Path of Light through a Microscope (D-142)

Beech-Nut Packing Co., Canajoharie, N. Y.
Tapping a Sapodilla Tree
A Chiclero at Work
An Expedition into Campeche, Mexico, after Chicle
Package Wrapping Machines

Brown and Sharpe Mfg. Co., Providence 1, R. I.
(Free to schools and instructors)
Brown and Sharpe Tools
Decimal Equivalents of Fractional Parts of an Inch
Brown and Sharpe Universal Bevel Protractor Readings
Brown and Sharpe Vernier Readings
Brown and Sharpe Micrometer Readings
Brown and Sharpe Micrometer Caliper-Sectional View

Chemical Elements, Box 315, South Lancaster, Mass.
A Chemical Wall Chart of the Chemical Elements — 75 cents

Fisher Scientific Co., 711–723 Forbes St., Pittsburgh, Pa.
Color reproductions of famous paintings:
The Alchemist, unframed — 50 cents
The Chemyst, unframed — 50 cents
The Alchemist in His Study, unframed — 50 cents

Hercules Powder Co., Inc., Wilmington, Del.
Safety Instruction in Chemical Laboratories

Hershey Chocolate Co., Hershey, Pa.
Hershey's Educational Wall Chart

Kewanee Boiler Corp., Kewanee, Ill.
Kewanee Firebox Boiler
Firebox Boiler Operators
Operation and Care of Firebox Boilers
Kewanee Residence Steel Boiler
Kewanee Boiler Stoker-Fired
Kewanee Round "R" Steel Boilers
Kewanee Steel Firebox Boilers
Kewanee Steel Boiler Type C Smokeless
Kewanee Steel Riveted Boiler

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Coal Tar Chart

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How to Become a Machinist, 250-BP — 10 cents
Decimal Equivalents, 777-BP — 10 cents
Principal Parts of a Lathe, 175-BP — 10 cents

L. S. Starrett Co., Athol, Mass.
Table of Decimal Equivalents
Starrett Tools, The Tools Mechanics Buy
Starrett Tap and Drill Chart, Drill Sizes
One Set Large Educational Charts, Blueprint Type:
Uses for Starrett Vernier Height Gauge
Uses for Starrett Depth Gauge
Uses for Starrett Vernier Caliper
Uses for Starrett Drill Point Gauge
Uses for Starrett Trammels
Uses for Starrett Surface Gauge
Uses for Starrett Combination Square
Uses for Starrett Protractors
Uses for Starrett Micrometer Caliper
Starrett Hack Saw Blades
Correct Manner for Starting Blade in Work
Uses for Starrett Inside Micrometer Caliper
Uses for Starrett Planer Gauge
Uses for Starrett Hook Rule

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Aluminum Company of America, 801 Gulf Bldg., Pittsburgh 19, Pa.
Chart on Chemistry and History of Aluminum
Machining Chart
Welding and Brazing Chart

American Brass Co., Waterbury 88, Conn.
Copper Family Tree Chart

E. C. Atkins and Co., 402 South Illinois St., Indianapolis 9, Ind.
Large Wall Chart which has illustrated fit-

ting instructions for hand, rip, and panel saws. Also illustrates a large variety of saws for manual training and industrial uses, and what they are used for.

Atlas Press Co., Kalamazoo 13D, Mich.
(25 cents per set of five)
Decimal Equivalents
Thread forms and Formulas
Lathe Cutting Tools
60-deg. V-Type Thread Dimensions
The Modern Back-Geared Screw-Cutting Lathe

Behr-Manning Corp., Division of Norton Co., Troy, N. Y.
Industry's Woodworking Abrasives
Coated Abrasives for Finishing Metal
Coated Abrasives, Descriptions and Uses
Industry's Oilstones

Bethlehem Steel Co., Bethlehem, Pa.
Heat Colors

Brown and Sharpe Mfg. Co., Providence 1, R. I.
(Free to schools and instructors)
Brown and Sharpe Tools
Decimal Equivalents of Fractional Parts of an Inch
Brown and Sharpe Universal Bevel Protractor Readings
Brown and Sharpe Vernier Readings
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6" and 10" Saddle Type Hydraulic Grinding Machines
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No. 2 Centerless Grinding Machine
No. 2MI Milling Machine

Henry Disston and Sons, Inc., Philadelphia 35, Pa.
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Hand Saws — Rip
Files
Hack Saw Blades

The DoAll Company, Minneapolis Division, 1301 Washington Ave. So., Minneapolis 4, Minn.
Educational Calendar
Machine Tool Progress Chart
Your Life in the Machine World Chart

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Fosdick Drilling Calculator

Globe Steel Tube Co., 3839 W. Burnham St., Milwaukee 4, Wis.
Corrosion and Heat Resisting Steel Analysis Chart
Bulletin No. 300-R (Stainless Analyses Chart)

R. K. LeBlond Machine Tool Co., Cincinnati 8, Ohio
Regal Wall Chart showing component parts of the engine lathe

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Plastics

Behr-Manning Corp., Division of Norton Co., Troy, N. Y.
Plastics Reference Chart

Durez Plastics and Chemicals, Inc., North Tonawanda, N. Y.
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New Casco Gluing Chart

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For Proper Vise Care

Henry Disston and Sons, Inc., Philadelphia, 35, Pa.
Wall charts on:
Hand Saws — crosscut
Hand Saws — rip
Files
Hack Saw Blades

Porter-Cable Machine Co., Syracuse 8, N. Y.
Abrasive Chart

Stanley Tools, Division of Stanley Works, New Britain, Conn.
Stanley Safety Charts — $2.50
95 Project Plans in Binder — $2
Tool Guide — 25 cents
Plan Book — 10 cents
Notebook Pages, 34 Looseleaf Charts on Use and Care of Tools — 17 cents set

United States Forest Service, United States Dept. of Agriculture, Washington 25, D. C.
Colored posters:
How a Tree Grows, W-3
"Smokey" Poster (Bear) — Fire Prevention
Need Marketing Advice?, W-10
Thin Your Crowded Trees, W-11
Proper Harvesting Pays, W-12
Cut Wolf Trees for Fuel, W-13
Cut Low Stumps, W-14
Know Your Timber, W-15
Charts:
Commercial Uses of Trees, D-1
Effects of Windbreaks on Wind Velocity, D-2
How Fire Ruins Timber, D-3
How the Tree Grows, D-4
What We Get from Trees, D-5 (four colors)
Saw Timber Stand Then and Now, D-6
Columnar Chart giving suggestions and indicating means by which the very interesting subject of forestry can be integrated into educational work at the elementary, junior high school, and senior high school levels
Maps:
Forest Trees and Forest Regions of U. S., V-1 (colored)
Forest Regions Map, V-2
National Forests, V-3 (colored)

John Winthrop, son of the first governor of Massachusetts, supervised the construction of the tiny blast furnace at Saugus, Mass., which produced the first iron made in North America. Winthrop raised the funds for the project in England and brought English and Scotch ironworkers back with him to operate the furnace.—*Steel Facts.*

The quality of the product that an industrial firm produces is the firm's best advertising. Likewise, the school shop and instructor are judged by the public almost entirely by the caliber of the projects that pupils take home.—*W. G. Williams.*

Qualities Required in Distributive Education Teachers

DONALD K. BECKLEY
Director, Prince School of Retailing
Simmons College
Boston, Mass.

A poll was made several months ago of a representative sampling of state supervisors of distributive education and teacher trainers to find out how the requirements for distributive education teachers compare in the various states, and to note what changes have taken place within recent years. A revealing feature of the answers received was a number of general comments as to the type of personality and background found to be most effective in distributive education work. These comments are varied, and because of their nature cannot effectively be tabulated. Several of them seem well worth repeating here as an indication of current opinion by the people most concerned in setting the requirements and observing the results:

"Although in normal times we placed emphasis on work experience, we have had to reduce our standards in this respect during the past few years. In several instances, classroom teachers of business education subjects have wished to enter our type of work. Where these people have appeared to have the personality qualifications for successful work in distributive education, we have been rather liberal in regard to work experience. We realize that this is not a good policy because those of our teachers who have had a substantial amount of work experience, particularly those who have come from the fields of merchandising into our program, are by far the most successful teachers. We hope to draw more and more of our people from business into our teaching work."

"A characteristic that we have found particularly necessary on the part of teachers is that they have the ability to talk to store owners, managers, and employees with a sure knowledge of store work and practices. Without that ability it often is difficult to get the co-operation which is so helpful in this type of work."

"At present qualified teachers are so scarce here in our state that we sometimes have to overlook the standards we have established. We hope that through our teacher-training programs established in our state colleges we may have in a few years more young people entering our profession who will qualify for such positions."

"In actually applying the standards we have set down on paper, we are most concerned with the apparent ability of the applicant to perform the job in a particular community. Thus as a general rule, we will not strictly apply the standards as listed but will approve the individual whom we think most appropriate for the job to be done. Above all we are most concerned that the individual has had good practical experience in the field of retailing, and are also concerned with his knowledge of how to present good practical ideas to his trainees. At the present time we are not unduly concerned as to whether or not the individual has a master's degree in the field, but I am certain that as the program increases this fact will take a much more important place in the picture."

"We believe that our standards for certification in this state are high, but we would not like to lower them for fear that our programs might deteriorate in quality. I believe that a distributive education program is doomed to failure without a properly qualified instructor. I do not think an instructor is qualified who does not have the occupational experience requirement as we have set it up: at least two years of experience in some one line of distributive occupation, a part of which time shall have been in a managerial capacity."

"In respect to work experience, we place at all times the emphasis on the quality of work (the training store), and how recently this training was received. In selecting co-ordinators we emphasize teaching ability, and in selecting itinerant instructors we emphasize work experience."

"We have not placed special stress on the master's degree as one of the qualifications for a distributive education teacher. In fact, our state plan will permit a teacher to qualify without having a bachelor's degree."

"It has been my experience that the best teachers must have three qualifications: (1) average intelligence, (2) ability to get along with people, and (3) full-time experience in retailing. I stress full-time experience because it gives the teacher a different slant on things. When one is dependent on a job for his or her meal ticket, he looks at the work differently than those who work as a 'side line.' I also find that a teacher with full-time experience has a more well-rounded experience because he has worked through all seasons and under many types of conditions."

"My preference would be for a person who has a bachelor's degree in business administration, some secondary school teaching, successful retail experience, and then a master's degree in distributive education. He would, of necessity, need to 'have teaching in his blood,' otherwise he would not give up retailing for teaching again."

"The person without retail experience never fully realizes the problems faced in the stores. It is not to be expected, then, that an otherwise good teacher could really teach distributive education classes, aid in solving problems he has never faced, and talk the language of the store work he has never learned."

"In appraising a candidate's qualifications in regard to the amount and type of store work experience to be of greatest importance, we believe department store experience to be the most valuable, and that it should be broad enough to cover firsthand acquaintance with a variety of functions. We also look for an individual with a personality which will enable her to work harmoniously with school administrators, other faculty members, and merchants. Regardless of the wealth of her educational and occupational experience the co-ordinator with an antagonistic personality cannot build a successful program because so much depends upon successful merchant-school contacts."

"We feel the master's degree to be of importance mainly because many of the new salary schedules being set up in local communities allow a higher starting salary for an M.A. or M.S. Therefore in the present shortage of qualified teacher co-ordinators we are in a better position to attract applicants if they can rate in the higher salary."

"We find that relatively few colleges or universities give the necessary training for distributive education in undergraduate work. Further, we find that many of the graduates of a college or university be-

tween the ages of 20 and 21 are not sufficiently mature to undertake the responsibility of the position as co-ordinator of distributive education. This fact is due, in large measure, to the tremendous amount of business relations work which a co-ordinator of distributive education undertakes for a school system. In view of this fact, it does seem that many prospective teachers graduate in a business education field and teach for two or three years, and then find that they would like to enter the vocational program of distributive education. In this case, the opportunity to take a master's degree gives these teachers the chance to obtain the necessary technical and professional training to undertake the work of a distributive education co-ordinator."

"We are particularly interested in store work experience that has been obtained on a co-operative basis in which the student has combined college training with co-ordinated experience. We have never set any definite amount of experience to be required because we believe that the co-operative experience exceeds the value of experience that may have been obtained in a rather haphazard manner with no definite objective in view."

"We have learned over the years that one year of required store experience is insufficient, and therefore we are raising our standards."

"We would very greatly prefer our teachers in this field to have a master's degree. Actual store experience, of course, is essential, but those with a year of graduate work have a much better conception of the entire program and its possibilities than we have found thus far for anyone on the bachelor level."

These comments on a wide variety of subjects relating to distributive education teachers suggest again that the same ideas on requirements for this work are not universally shared. Teachers and prospective teachers, nonetheless, can find here some suggestion as to the trends in teacher co-ordinator requirements, and in the manner in which one is to prepare for them.

Sunburns and Heatstroke in Industry

DR. WALDEMAR SCHWEISHEIMER
Rye, N. Y.

A most interesting study on the connection of sunburns and absenteeism from work has been made by Louis Stambovsky. While about 60 million persons were employed in America during the war, at least half of them indulged in some sort of outdoor activity during the warm months. Of these, 50 per cent (15 million) indulged in sun irradiation too strong for their safety tolerance. This resulted in 15 million burns which were in all degree from mild discomfort to hospitalization.

Half of these 15 million sun injuries were of sufficient severity to cause the loss of one day's work. Altogether industry lost about seven and a half million man-days in a single summer season, in addition to a large number of man-hours due to impaired efficiency, change of schedules by absentees, and the like. A review of Monday and Tuesday absenteeism during June, July, and August, Stambovsky says, showed that the worker's efficiency was at least decreased for one or more days.

Sunburns

The tanning of the skin which follows exposure to sunlight is preceded by more or less redness and sometimes by swelling and blistering. The pain may be severe, contact with clothing most unpleasant, and belts or suspenders unbearable. Shocks, chills, high fever, and nausea are signs of severe sunburns.

When the redness due to sunburn disappears, the skin of brunette people may be left tanned while that of blondes is freckled. Pigmentation is a protective measure of the body against further injury by excessive sunrays. The ultraviolet rays of the sun are most effective in producing sunburn, the more so where they are reflected by water, snow, or white chalky soil. The rays are most dangerous in spring and early summer when exposure takes place before protective tanning has formed. Stambovsky made a survey of today's usual treatment of sunburns. Relief of pain should be the first objective. A good anesthetic ointment, of which there are several excellent proprietary brands available, should be generously applied and covered with thick layers of gauze to prevent contact removal. Cod-liver oil ointment, carron oil, and petrolatum also are helpful. Absolute rest will hasten recovery. Ice compresses have been found to control the itching sensation connected with sunburn. Diet should be light, with plenty of fluids.

Experiments by Kuckeish show the effects of June sunlight at noon on the average untanned skin. After twenty minutes a small erythema (redness) of the skin appears. After fifty minutes a vivid erythema has appeared; after a hundred minutes a painful burn is observed, which at the end of two hundred minutes changes to a blistering burn. It also must be remarked that the ultraviolet reflections from the surface of water may increase the effects of the direct rays of the sun as much as 100 per cent.

Most persons cannot or will not believe that the warmth and relaxation of sunbathing may be sources of potential danger. Warnings to this effect are disregarded in many cases. So, Stambovsky says, the use of an efficient sunburn preventive seems to be the only sure way of avoiding sunburns. These protective preparations may be in the form of creams, oils, or lotions. Their helpfulness is dependent upon an ultraviolet screen or filter contained in solution or suspension. Esters of para-amoni-benzoic acid have been found ideal for use in sunburn preventives, but there are many more chemical compounds suited as protection of the skin. An efficient sunburn preventive should not permit the passage of more than 25 per cent of the effective rays of the sun.

Sunstroke and Heatstroke

We have to differentiate between the effects of the sun and those of heat on the human body. Prolonged exposure of the uncovered head to the direct rays of the sun may produce a real sunstroke; here the blood vessels of the brain are dilated and overfilled with blood; a small blood vessel may even burst within the brain and produce a cerebral hemorrhage. At any rate, the face becomes flushed, there are signs of vehement headache, attacks of giddiness, vomiting, the pulse is weak and fast, and the patient may suddenly fall unconscious, as though felled by a stroke. This is a dangerous stage.

In contrast to the local effects of the sun

in the event of a sunstroke, a heatstroke is due to the general overheating of the human body. It has been found that in factories efficiency falls with rising inside temperatures, and in hot industries the industrial output is higher in winter than in the hot months. In a tin-plate factory, production in the hottest months of the season was 10 per cent lower than in the coldest months of the year. In an ill-ventilated factory the decline in output was 30 per cent.

In hot, humid weather (sunshine may even be absent) the natural giving off of body heat is decreased, and more heat is produced within the body. This means an increase of body temperature from normal 98 to 99 deg. F. to a fever temperature of 104 and 105 and even higher. The effect is still stronger when the liquid lost by perspiration has not been replaced by corresponding quantities of water. This means loss of fluids from the blood.

There are always poisonous substances in the blood which cause no harm in the usual degree of dilution; however, when the water content of the blood is too low, the problem is quite different. In the deep mines of South Africa, air temperature sometimes reaches 95 deg. F. with 98 per cent humidity, and air moving at only 20 cu. ft. a minute. Under these conditions, workers' temperatures may rise to 102 deg. because their sweat cannot evaporate and cool them.

Water and Salt are Important

For immediate treatment of sunstroke and heatstroke the patient should be placed in the shade or in the coolest place available in a building or outdoors. The clothing should be stripped from the chest, and both trunk and head are to be cooled with cold water. Adequate amounts of water internally are important. They may be given as an enema or intravenous solution with unconscious patients. Workers, at all times, should drink as much water as they want, and preferably more. In the simoom, the hot, dry, poison wind of Arabia, whole parties of men sometimes perish together. Experts think they lose so much water by sweating (up to two quarts an hour) in the dry air that they lose the ability to sweat and their bodies become defenseless against the heat.

Sweating takes large amounts of salt from the body, and it has to be replaced. A little table salt added to the water (a level teaspoonful to a quart of water, or a 15-grain tablet with a glass of water) may be very refreshing. Many plants locate salt tablet dispensers next to the drinking fountains. Another salting mechanism involves an electrically operated device for introducing a known amount of salt into a mixing tank.

Observations by Taylor and his coworkers on workers exposed to industrial heat exhaustion, showed that rest, food (with salt), and water were sufficient to restore all men so that they could continue to work in the heat for hours. The conclusion was that heat exhaustion and ability to work in the heat are almost wholly dependent on the function of the heart and the blood vessels. Moderate intake of salt is more important to preserve this function of the heart than to prevent heat cramps. However, for both prevention and treatment of heat exhaustion is the timely replacement of water in the body, and this is decisively more important than the replacement of salt.

Problems and Projects

CLEANUP ASSIGNMENT WHEEL

LOUIS S. TAYLOR

Department of Industrial Education
University of California
Santa Barbara, Calif.

"Time to Clean Up" is almost a byword among shop teachers throughout the country, yet there are many different ways of doing the job and much variety in assigning the work in connection with cleanup time.

Because of the variation in subjects taught, the condition and quality of the equipment in the shops, and the caliber of the student, there is bound to be diversities in the methods used in assigning cleanup duties. Most shop teachers agree, however, that the responsibility of cleanup belongs to the student and that it becomes a hardship to the instructor if it is not handled properly.

It seems to be natural for the student and others to leave the tools and materials as well as the mess they have made for someone else to clean up. It also seems natural for them to resist any attempt on the part of the instructor to assign cleanup duties. This task can be greatly facilitated by the use of a system that will give every student in the class an equal opportunity to share in the work and the knowledge that every other student is also responsible for a part of the work. It is very important to the success of any venture of this nature that each student knows exactly what is expected of him and that he thoroughly understands that he will be held responsible for his part in the process.

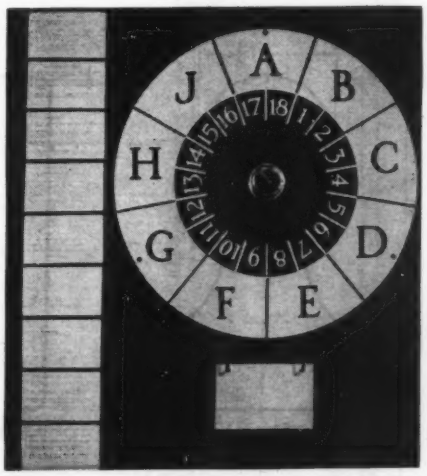


Fig. 1. Cleanup assignment wheel

The following is an attempt to describe a plan that is not altogether new but embodies some new features and may serve in a small way to inspire shop teachers to improve the method they now have in use. This system has been tried in several metalworking classes and has proved to be highly successful both as a device to designate responsibility and as a means of stimulating the spirit of co-operation on the part of the student.

The device shown in Figures 1 and 2 is commonly called an assignment wheel and can be made by cutting two metal disks 12 and 19 in. in diameter, respectively. The two circles or disks are drilled on centers with a 3/8-in. drill and put together in such a manner that the smaller one can be securely locked in any desired position to the larger disk. This can be accomplished by the use of a twin knob arrangement as shown in Figure 2.

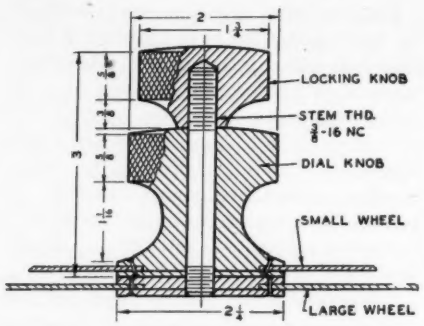


Fig. 2. Locking knob for assignment wheel assembly

The small upper knob is attached to a ⅜-in. rod of the proper length that goes through the second knob and is threaded into the bottom of the 19-in. disk. It will be necessary to add a piece of thicker material to the center of the 19-in. disk so that there will be enough for threads. This can be done by cutting a 2-in. hole in the center of the disk and machining a piece to be fitted into the hole.

The 19-in. wheel was divided into nine equal parts and labeled A, B, C, D, E, F, G, H, and J to represent the job areas involved in the cleanup. These letters were made by casting them from aluminum. They were riveted to the wheel with small wire brads.

The number of spaces can be altered to suit the fancies of the maker, or they may be determined by the job areas to be included in the assignments. By using letters instead of job names the wheel can be used for as many classes as desired. A legend is all that is needed then and this can be typed on separate cards and mounted by the side of the wheel. The description of the job areas or legend can be made to suit the conditions where the wheel is to be used or a different legend can be used for each class.

For reasons of suggestions the legend used with the wheel at the industrial-education shop, Santa Barbara, Calif., is as follows:

A — Tools

Duties:

1. Check to see that all hand tools are in their proper places at the close of each class period.
2. Keep all hand tools in good repair.

a) Replace broken or damaged hammer handles.

b) Sharpen edge tools if or when needed.

c) Take necessary precautions to prevent rust on tools.

3. At the close of each class period report condition of tools and any irregularities concerning the tools to the foreman.

B — Benches and Tables

1. Brush and clean off all benches and tables at the close of each class period.
2. Return bench brushes to the proper place.
3. Report the presence or absence of tools or stock to the foreman.
4. Report condition of the benches to the foreman at the close of each class period.

The rest of the letters carry a similar connotation; C standing for stock, D for motorized machinery, E for nonmotorized equipment, F for foreman, G for blackboards, windows, and doors, H for foundry unit and J for spray booth and arc welding booth. The letter *I* was purposely omitted to prevent any confusion with the figure one.

The small wheel was divided into 18 equal parts and labeled accordingly with figures cast from aluminum. By using 18 numbers, which by the way are assigned to students in each class for the entire semester or work period, there are two students for each job, making it possible to shift half of the class (even numbers) into new jobs and have the other half of the class retain the formerly assigned task.

That means that each student has two weeks or two days, whichever is used, to learn his clean-up duties and a chance to break in a new man when the wheel is shifted.

Be sure to assign numbers to all students and see to it that all numbers are used. This may necessitate duplication in some cases.

A HANDY NAME STAMP

CHARLIE HEPFINGER and DON R. McMAHILL
Technical High School
Omaha, Neb.

Frequently a stamp is a necessity in a school shop, and it need not necessarily be made with rubber type. There are hundreds of type faces available in the modern print shop, and if your school does not have a printing course, you can prevail upon a local company to cast the necessary lines in the face you prefer.

If your school print shop provides the lines, have them cast in script, Old English, or a light-faced Stymie. For special emphasis, a bold Century may be used. Type sizes may vary as you direct, although an 8- or 10-point seems most popular.

The holder for the slug on which the type is cast may be made from scrap stock, as shown in the illustration. It must be made to fit the length of the line.

Mounting the slug permanently may be done with light bolts, rivets, or with plastic wood.

If a stamp with a special design is needed, perhaps the art department will supply it cut in rubber, or as a linoleum block. Such a stamp may be mounted on a large cork.

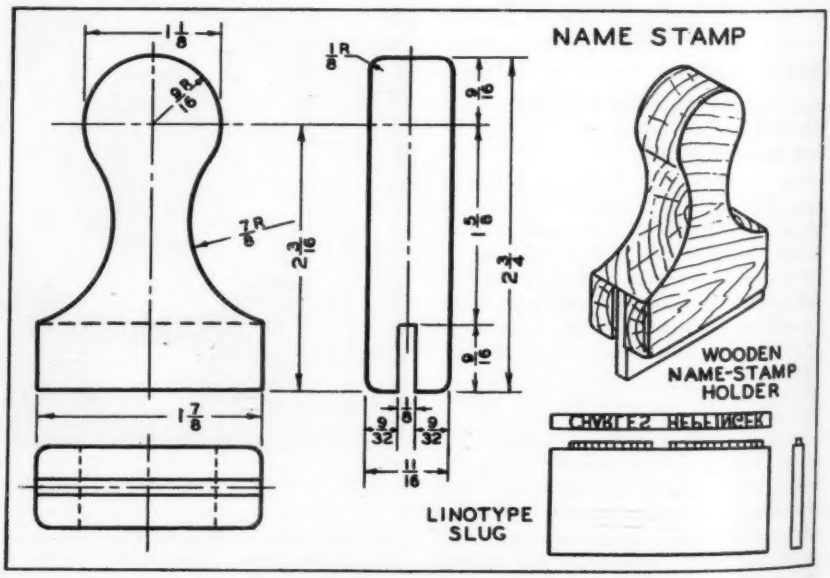
All of these homemade stamps will do a fair job, and answer the purpose fairly well. A *rolling* motion will produce a good impression and give the stamps longer life. Experiment with scratch pads for a soft *backing* under the material being stamped, and you will soon learn the knack of it.

The ordinary stamp pad will do very well with these improvised stamps.

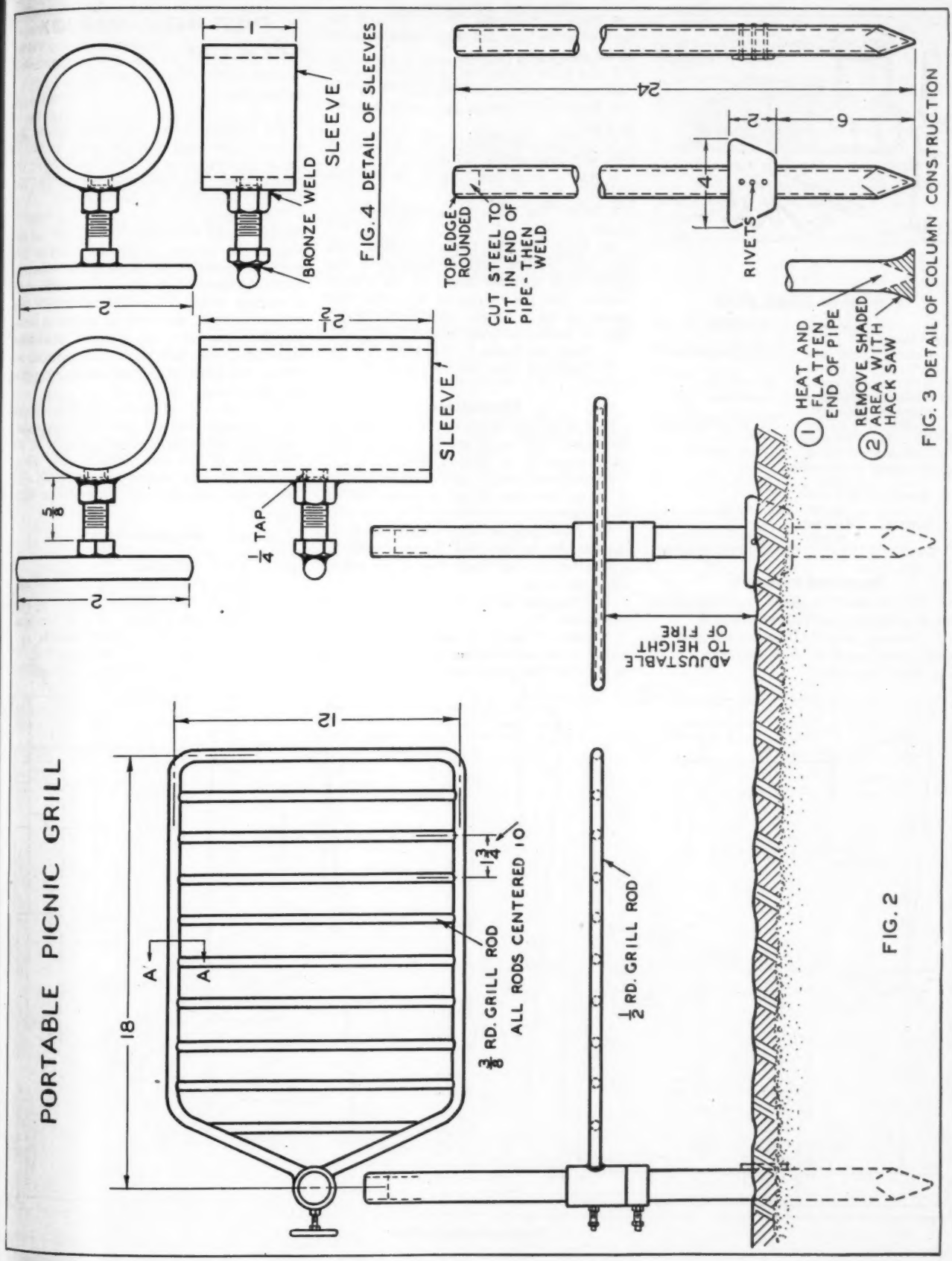
PORTABLE PICNIC GRILL

HOMER C. ROSE
Falls Church, Va.

The picnic grill shown in Figure 1 has been used for a number of years and has proved to be a very practical piece of camping equipment. It is adjustable for height and may be swung on or off the fire as desired. It is not very heavy, and when disassembled, takes up very little space. As a project it offers the builder experience in working with pipe, welding, forging, riveting, and thread cutting.



A handy name stamp



Portable picnic grill

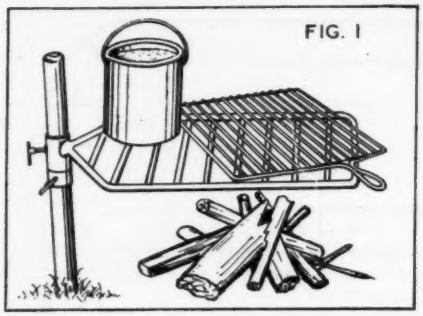


Fig. 1

BILL OF MATERIALS

No. of pieces	*Name*	*Material*	*Size*
1	Column	Std. steel tubing	1-in. I.D. x 24 in.
8	Grill rods	Round rod	⅜ x 11½ in.
1	Grill frame	Round rod	½ x 60 in.
1	Sleeve for grill	Std. steel tubing	1¼-in. I.D. x 2½ in.
1	Sleeve for column	Std. steel tubing	1¼-in. I.D. x 1 in.
1	Iron plate	⅛-in. mild steel	2 x 4 in.
3	Rivets	R.h. iron rivets	3/16 x 2 in.
2	Screws	Machine screws	¼–20 n.c. x ⅝ in.
2	Nuts	Iron	¼–20 n.c. hex. head

Suggested Procedure

1. Cut the stock to length according to the bill of materials and Figures 2 and 3.
2. Flatten the end of the column and cut away shaded areas shown in Figure 3.
3. Weld the point.
4. Place a small solid piece of stock in the top end of the pipe and weld in place. Grind off all rough projections.
5. Cut plate to size and fasten to the stake. This may be done by welding or riveting.
6. Braze ¼–20 nuts to the sleeves as shown in Figure 4.
7. Drill the pipe through the holes in the nuts with appropriate tap drill.
8. Run a hand tap through the nut and pipe to complete the threads.
9. Make the clamping screws shown in Figure 4.
10. Bend the grill frame to shape using heat from welding torch or forge. It is suggested that the two bends at the corners farthest from the column be bent first. Care should be taken to get these bends exactly right to match the cross rods.
11. Weld the frame to the sleeve.
12. Weld the cross rods in place.

Alternatives

Pipe of suitable diameter could be used for the frame. This would give the builder additional experience in bending pipe.

An additional smaller grill could be designed to fit on the stake to aid in camp cooking. Note Figure 1.

The pipe could be fitted with a cap at the top and this in turn could be the handle for a poker which would hang down in the column when not in use.

The clamping screw on the grill may be eliminated.

A series of holes in the column through which a pin could be inserted could be used in place of the lower sleeve.

SHEET-METAL MAILBOX

GLEN M. KIBLER
Greiner Junior High School
Dallas, Tex.

The mailbox shown and described in this article can be adapted to the small as well as the large shop since it does not require expensive tools and equipment to perform the necessary operations in construction.

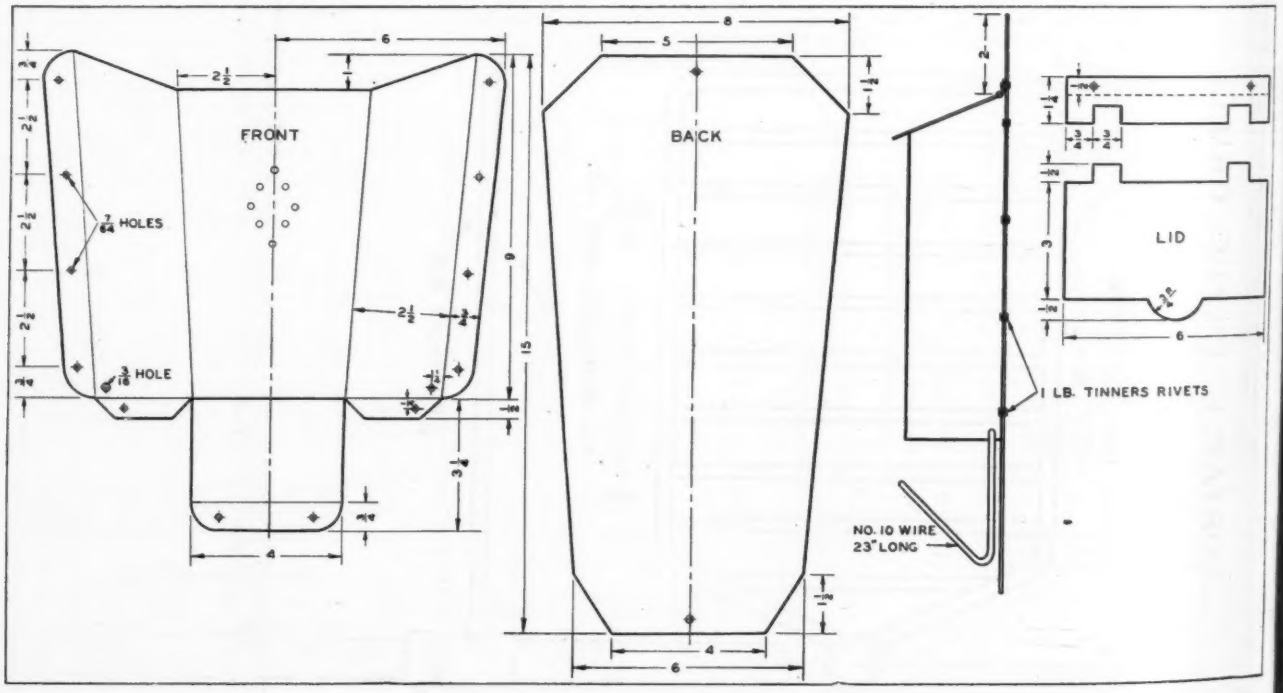
The diamond shaped design in the front of the box could very easily be changed to initials of the student, or any other design that might be chosen by the pupil or the instructor.

This mailbox will confront the student with a problem which will test his ability to plan a procedure, lay out a design properly, measure with exactness, lay out and drill holes correctly, bend and shape sheet metal, set rivets, and construct a hinge from two pieces of sheet metal.

In the process of testing the student's ability, the instructor will also have an opportunity to check his progress on some of the objectives of the work such as wise use of time and material, appreciation of good work and design, self-reliance, manipulative skills, etc.

BILL OF MATERIAL

No. of pieces	*Name*	*Material*	*Size*
1	Front	Sheet metal	12 by 12¼ by 24 ga.
1	Back	Sheet metal	8 by 15 by 24 ga.
1	Lid	Sheet metal	5 by 16 by 24 ga.
14		Rivets	1 lb. tinner's
1		Wire	No. 10 by 23 in.
1		Wire	No. 10 by 6 in.



Sheet-metal mailbox

Tools needed: Scriber, dividers, steel rule, square, bench punch, tinner's snips, mallet, center punch, pliers, bar folder, hand drill, drill bits, rivet set, and hammer.

Procedure:

1. Obtain material and lay out the four parts of mailbox as shown on drawing.
2. Cut to shape with tinner's snips.
3. Remove sharp edges with a file.
4. Drill 7/64-in. holes in front part of mailbox.
5. Punch 5/16-in. holes in the center of front part (any design).
6. Punch 3/16-in. holes for wire hanger.
7. Turn 3/4-in. flange on the edges of front at a 90-deg. angle.
8. Bend box to shape and rivet laps at the bottom.
9. Locate and drill holes in the backpiece.
10. Rivet front and back together.
11. Hinge the lid together using a No. 10 wire, 6 in. long.
12. Drill holes and rivet lid in place.
13. Bend wire hanger to shape and place it in box.
14. Finish as desired.

MATCHBOX HOLDER

O. R. BANNISTER
Instructor, Industrial Arts and Crafts
Givins Street School
Toronto, Ont., Canada

Materials: No. 26 gauge galvanized iron or 1X tin plate; 50–50 solder, soldering flux; 1/8-in. soft iron or tinned r.h. rivet.

Tools: Scratch awl, rivet set, soldering copper, tinner's snips, bar folder or brake, hammer, drill.

Procedure:

1. Lay out stretchout on the metal. (Your layout must be checked by instructor before cutting.)
2. Cut to shape.
3. Fold single hems Nos. 1, 2, and 3, on part *B*.
4. Bend on lines No. 3 to a right angle.
5. Form quarter circle roll at end of bottom piece.
6. Bend at No. 4 on forming block.
7. Cut 2 by 5-in. strip and fold a single hem on the two long edges.
8. Drill two 1/8-in. holes and one 3/16-in. hole.
9. Rivet *A* to *B*.
10. Solder where the sides meet the bottom of the matchbox holder.

Questions:

Be prepared to answer any of these.

1. What material is used and what is its gauge?
2. Name the tools used to make this project.
3. What size are the rivet holes?
4. How long a rivet should be used?
5. What materials are used in solder, and what are their proportions?

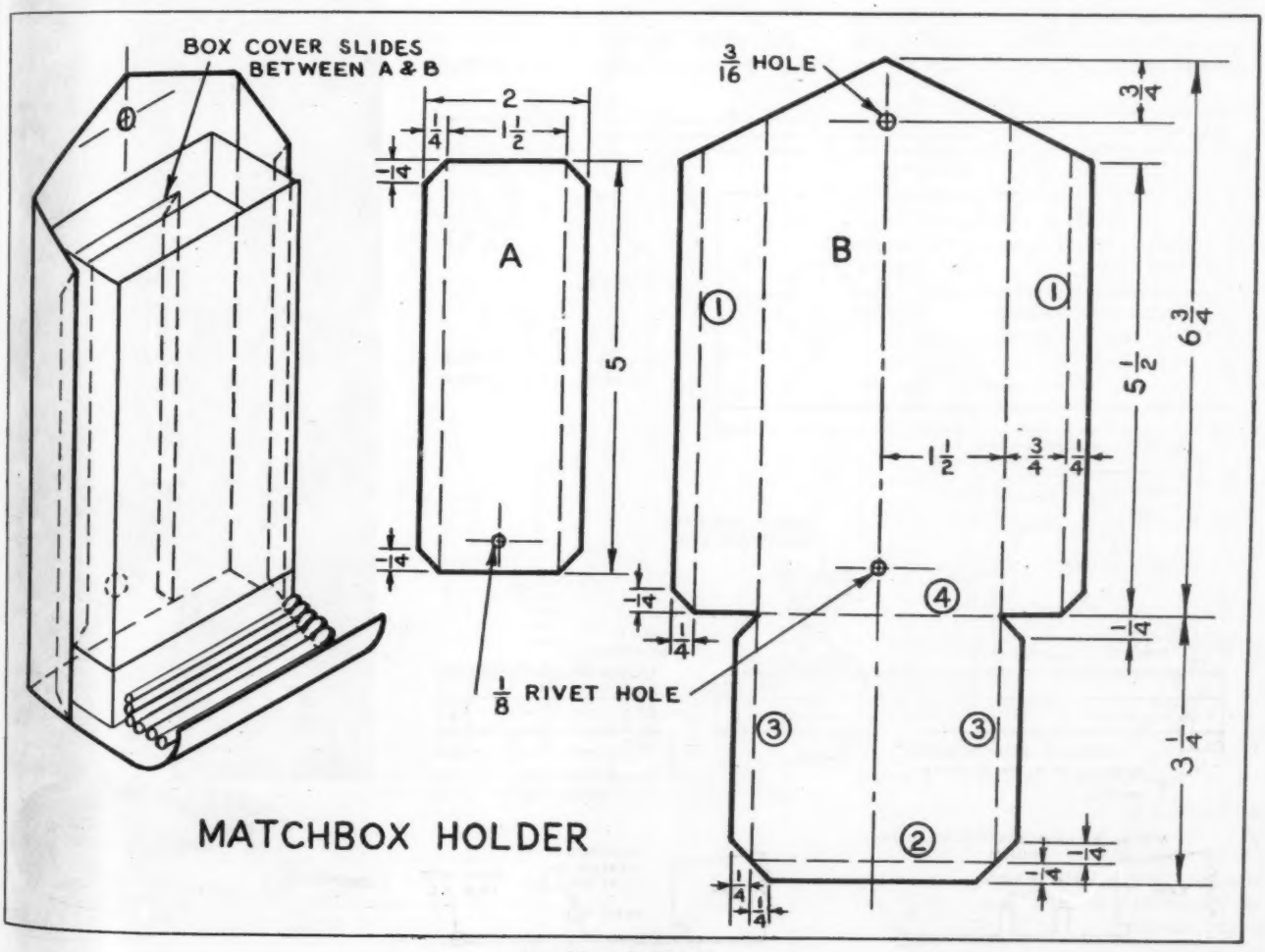
References:

The individual instructor may fill these in.

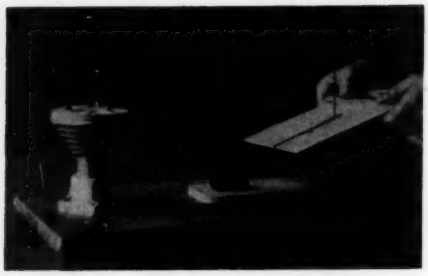
HOT WIRE JIG SAW

A. G. BELESON
High School of Science
Bronx, N. Y.

The hot wire jig saw described in this article was developed in our science laboratory shop for demonstration purposes. It operates on 110-volt a.c. or d.c. current. It will also operate at lower voltages if a proper transformer is used on an a.c. circuit.



Matchbox holder



Hot wire jig saw

The wood is "cut" by moving the wood up and down on the hot nichrome wire. Do not apply pressure. If the nichrome wire should break, just loosen the screws and use the extra nichrome wire that has been allowed to hang on the upper part of the jig-saw arm.

It is important to insulate the arm with rubber tubing. Wet the inside of the rubber tubing so it may be pushed on the metal arm more easily, after the arm has been completed.

If a 1000- or 2000-watt resistance coil is not obtainable, two 550- or 600-watt resistance coils, joined in series, may be substituted.

An electric heater or an electric flat iron may also be used as shown, to draw the high amperage needed to operate the saw.

Replacement elements may usually be obtained at the 5- and 10-cent stores.

BILL OF MATERIALS

No. required	*Material*	*Size*
1	Wood	13/16 x 7½ x 18
2	Wood	13/16 x 1½ x 18
1	Wood	13/16 x 1½ x 7½
1	Band iron	⅛ x ½ x 18
1	Band iron	⅛ x 1½ x 2½
1	Rubber hose	½ inside dia. x 16
1	Porcelain electrical receptacle	
1	Asbestos	⅛ x 7½ x 18
2	Machine screws	8/32 x ½ r.h.
2	Machine screws	8/32 x 1½ r.h.
4	Hex. nuts	8/32
10	Wood screws	No. 6 x ¾ f.h.
2	Wood screws	No. 6 x 1 f.h.
2	Wood screws	No. 8 x 1 r.h.
1	Resistance coil	1000 or 1200 watts
1	Nichrome wire	20 ga. x 10
16	Finishing nails	No. 18 x 1½

A LAMP THAT THE AVERAGE SHOP STUDENT CAN MAKE

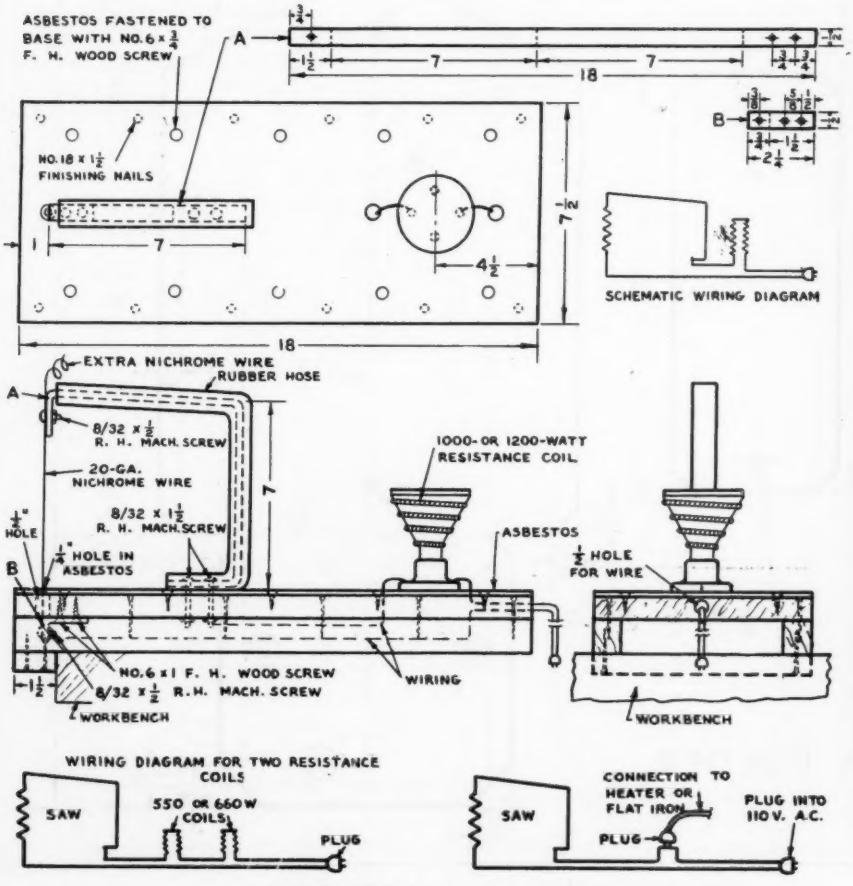
H. A. ALLENDER

Instructor of Woodwork
Will Rogers High School
Tulsa, Okla.

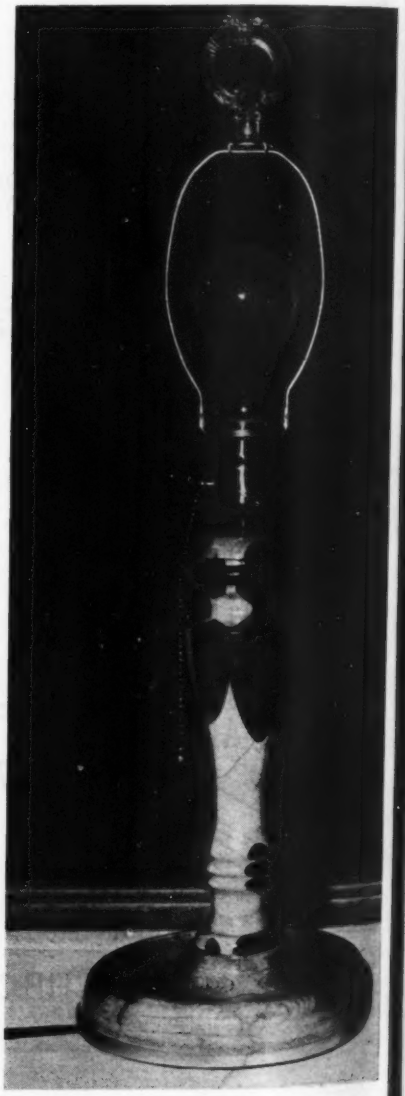
This article describes an attractive table lamp that can be made by the average high school boy. The design is simple and easily understood. It is one answer to the problem of how to guide the efforts of many boys who desire to turn a piece of work and yet are unable to proceed on the lathe without that close supervision that the busy wood-shop teacher, burdened with large classes, is hardly able to give.

The upright is made of glued up stock as shown. This adds a variety of color as well as design due to the fact that an arrangement of different woods may be used. Maple, cedar, mahogany, and walnut are the most popular choices in the writer's shop. Any desired combination may be employed.

The making of the hole through the upright is accomplished by sawing small grooves in the center of the two halves of the core, before the first glue job is done. This sawing is done on the power saw. This hole could also be produced by grooving the two halves of the core on the shaper.


ASBESTOS FASTENED TO BASE WITH NO. 6 x ¾ F. H. WOOD SCREW
NO. 18 x 1½ FINISHING NAILS
SCHEMATIC WIRING DIAGRAM
EXTRA NICHROME WIRE
RUBBER HOSE
8/32 x ½ R. H. MACH. SCREW
20-GA. NICHROME WIRE
8/32 x 1½ R. H. MACH. SCREW
¼" HOLE
¼" HOLE IN ASBESTOS
1000- OR 1200-WATT RESISTANCE COIL
ASBESTOS
¼ HOLE FOR WIRE
NO. 6 x 1 F. H. WOOD SCREW
8/32 x ½ R. H. MACH. SCREW
WIRING
WORKBENCH
WIRING DIAGRAM FOR TWO RESISTANCE COILS
SAW
550 OR 660W COILS
PLUG
CONNECTION TO HEATER OR FLAT IRON
PLUG INTO 110V. A.C.

Details of hot wire jig saw



A fine turning project

The base may be made from one, two, or four pieces of 2-in. stock as shown. The upright is made from 1-in. stock. The base is made from 2-in. stock. This project provides opportunity to utilize small scrap stock that accumulates in the woodshop.

During the school year 1946–47, 75 lamps of this kind were made in the writer's classes.

The method of procedure in making this project is as follows:

1. Make core.

a) Get out two center pieces of stock ¾ by 1¾ by 12 in.

b) Saw grooves for hole for cord.

c) Joint faces to be glued and glue as shown.

2. Get out two pieces ¾ by 1¾ by 12 in.

a) Joint surfaces that are to be glued and glue onto core as shown.

3. Get out two pieces ¾ by 3½ by 12 in.

a) Joint surfaces that are to be glued and glue onto core as shown.

4. Plug hole at ends of stem with short white pine plugs so as to provide solid surfaces for lathe centers. Turn the upright.

NOTE: the bottom end of the upright should be at the live center of the lathe.

5. Make and turn the base, including the hole in the base for the stem. The detail drawing shows how four pieces of stock may be used in the construction of the base. The base may also be made of one solid piece, or it may be made of two pieces.

6. Glue the upright into the base. Use lathe for clamping lamp between centers while glue is drying.

7. Complete finishing touches and sand.

a) Raise grain with water and sand again.

8. Apply French polish. One coat only. Let dry overnight.

9. Remove faceplate and drill out plug at top end of stem using ⅜-in. wood auger bit. Drill hole meeting sawed groove inside of stem.

10. Drill hole through the base at center into stem meeting the groove inside of the upright.

11. Wire lamp.

a) Screw a piece of ⅛ by 2-in. running threaded gas pipe into top of stem leaving ½ in. extending out of stem.

b) Insert cord through gas pipe and lamp upright. Sharp burrs should be removed from the ends of gas pipe before wiring.

c) Dismantle socket and screw shell onto gas pipe. Tighten small screw in collar of socket shell. This assembly will fit snugly and firmly if carefully done.

d) Attach switch mechanism to end of cord and reassemble socket.

e) Attach male plug to other end of cord and test.

f) With half round, small wood gouge, carve groove from center of base to outside circumference of base for the cord. This groove should run parallel with the grain. Fasten the cord into the groove with double pointed tacks.

12. Glue piece of colored felt onto base bottom.

13. Spray with clear lacquer.

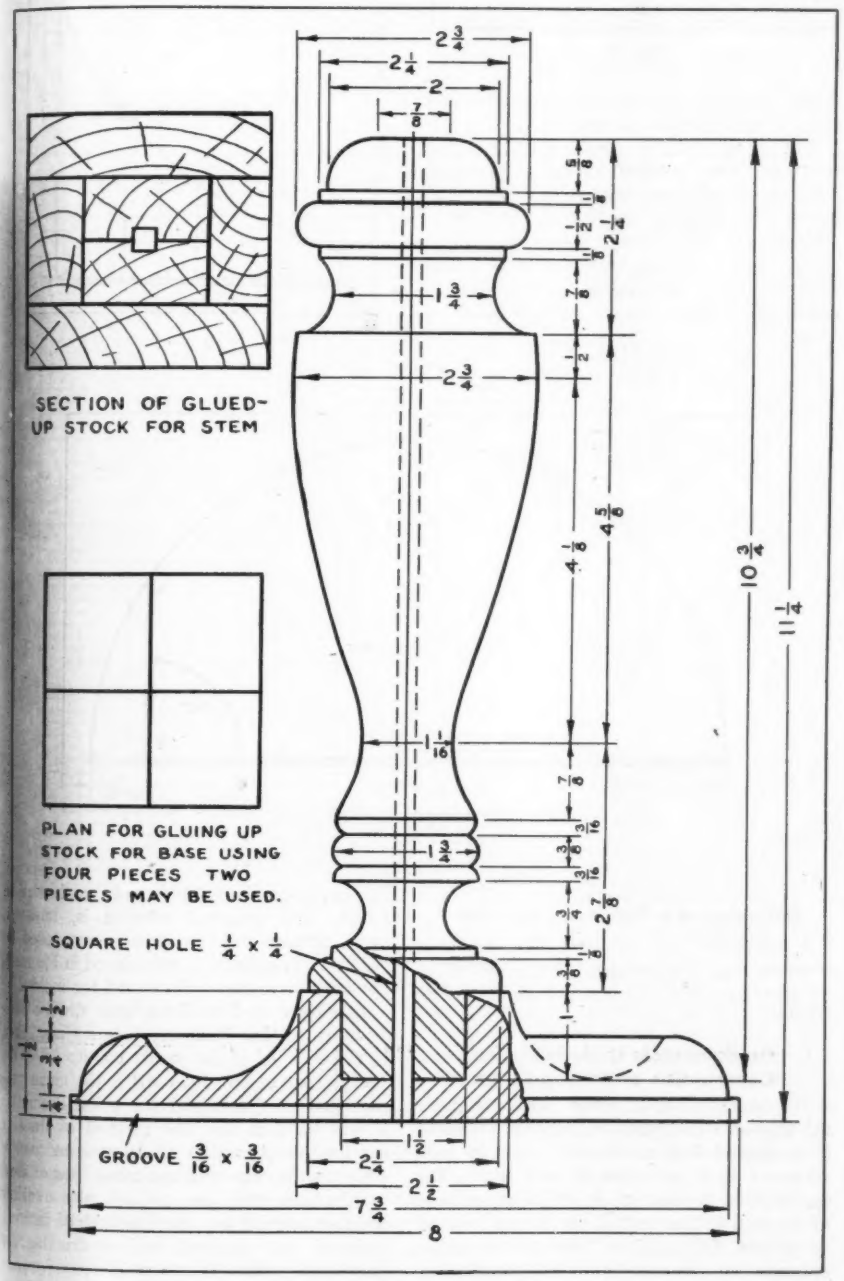
14. The bulb and shade may be secured at ten cent or electrical stores.

Specifications of electrical parts:

Socket: Metal shell, push pin or pull chain switch, with ⅛-in. inside pipe thread in bushing end.

Cord: Insulated with rubber or cloth, or both; two wire appliance. Color brown, white, or black.

Plug: Rubber insulated male plug.



Turned wood lamp upright

LOGARITHMS MADE EASY

S. G. COLINESE

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There are several ways of approaching the study of logarithms. Few of these are as interesting and as easy to understand as the graphical approach. A reasonably accurate logarithmic curve can be constructed by means of a ruler, a pair of compasses, and a draftsman's triangle. No reference to logarithmic tables is necessary although these may be

used for the purpose of checking the accuracy of the graphical method. Students can set out a curve for their own use in less than 30 minutes and they will then have before them a clear single picture of the logarithmic process which will make the subsequent use of log tables infinitely easier and more pleasurable when compared with more conventional methods.

Laying Out the Logarithmic Curve Graphically

Lay out a base line of length, say 5 in. Then draw an ordinate of 5 in. at the right hand end, as shown in Figure 1. Next, divide the base line into 10 equal parts.

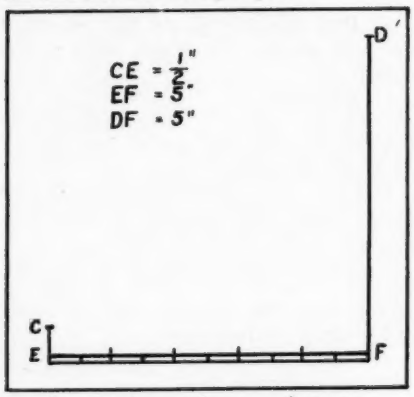


Fig. 1. Logarithms made easy

Next, draw a line equal in length to the sum of the two ordinates shown in Figure 1. This line will be 5½ in. long. Draw a semicircle on this line, as shown in Figure 2. Lay out on the lengths 5 in. and ½ in. as shown, and draw the perpendicular *AB*. This

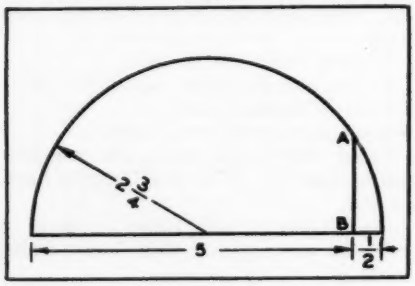


Fig. 2

perpendicular, then, is the length of the ordinate to be set up at the midpoint of the base line laid out in Figure 1. A fair curve joining *C* and *D* and passing through *A* will provide an approximate logarithmic curve. See Figure 3.

To attain greater accuracy, it is necessary to construct further intermediate ordinates. The method used in finding the lengths of these ordinates is the same as that just described.

To find the length of the ordinate midway between *AB* and *CE* in Figure 4, draw a diameter equal to the sum of the lengths *AB* and *CE* and proceed as shown in Figure 2.

To find the length of the ordinate midway between *AB* and *DF*, Figure 5, draw a diameter equal to the sum of the lengths *AB* and *DF* and proceed as before.

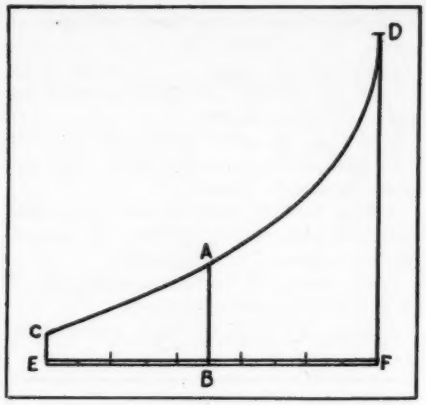


Fig. 3

The more accurate curve may now be drawn as shown in Figure 6. For all practical purposes this is good enough but if greater accuracy is required the lengths of further midordinates may readily be found. Where graph paper is available a curve with a base length of 10 in. will provide an even greater degree of accuracy. Such a curve is shown in Figure 7.

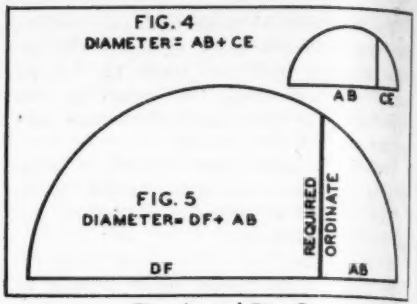


Fig. 4, and Fig. 5

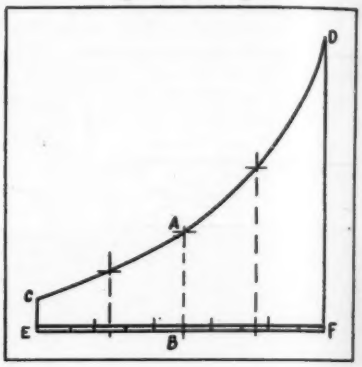


Fig. 6.

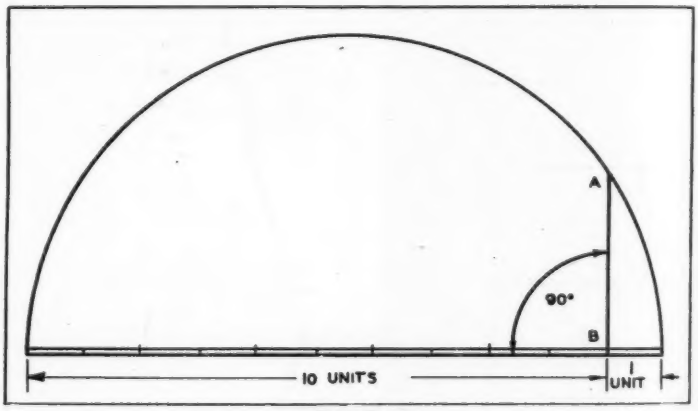


Fig. 8

Definition of a Common Logarithm

A logarithm with the base 10 is called a common log. The logarithm of a number is the power to which 10 is raised to equal that number.

Fundamentals Underlying the Construction of the Log Curve

It requires no great effort to write down the logs of a few numbers between 1 and 10 if, instead of thinking of whole numbers such as 4 or 6 or 7, we think of roots of 10. The log of 10 is 1, and the log of the square root of 10 is 0.5. The log of the fourth root of 10 is 0.25. If a table of values is to be set out successive square roots of 10 must be determined. They can, of course, be found by calculation or by reference to mathematical tables. The graphical method is, however, much simpler and has already been used on Figure 2. This figure is reproduced in Figure 8, but units have been substituted for inches.

In Figure 8, 5 in. have been divided into 10 units, so that ½-in. represents 1 unit, then to the scale of ½ in. equals 1 unit, *AB* is the square root of ten. Also *AB* is the mean proportional of 1 unit and ten units. From this it will be seen that the method of drawing the log curve consists of determining graphically the square root or mean proportional as the case may be, and thereby avoiding lengthy calculations. As a matter of interest, although not required for constructing the curve, the values of a few successive square roots of 10 are shown in Table 1.

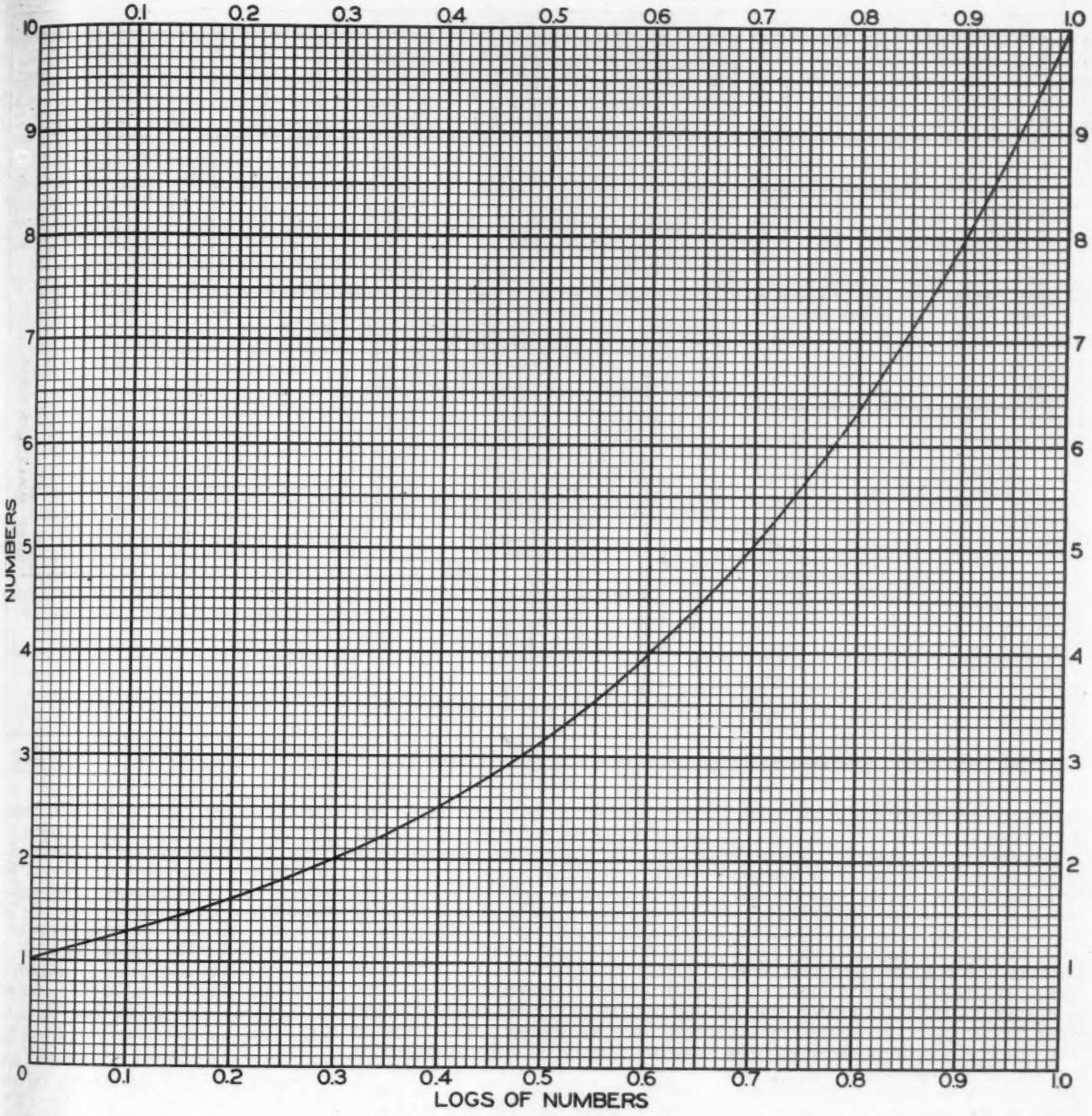


Fig. 7. Logarithmic curve

TABLE 1. A Few Successive Square Roots of 10.

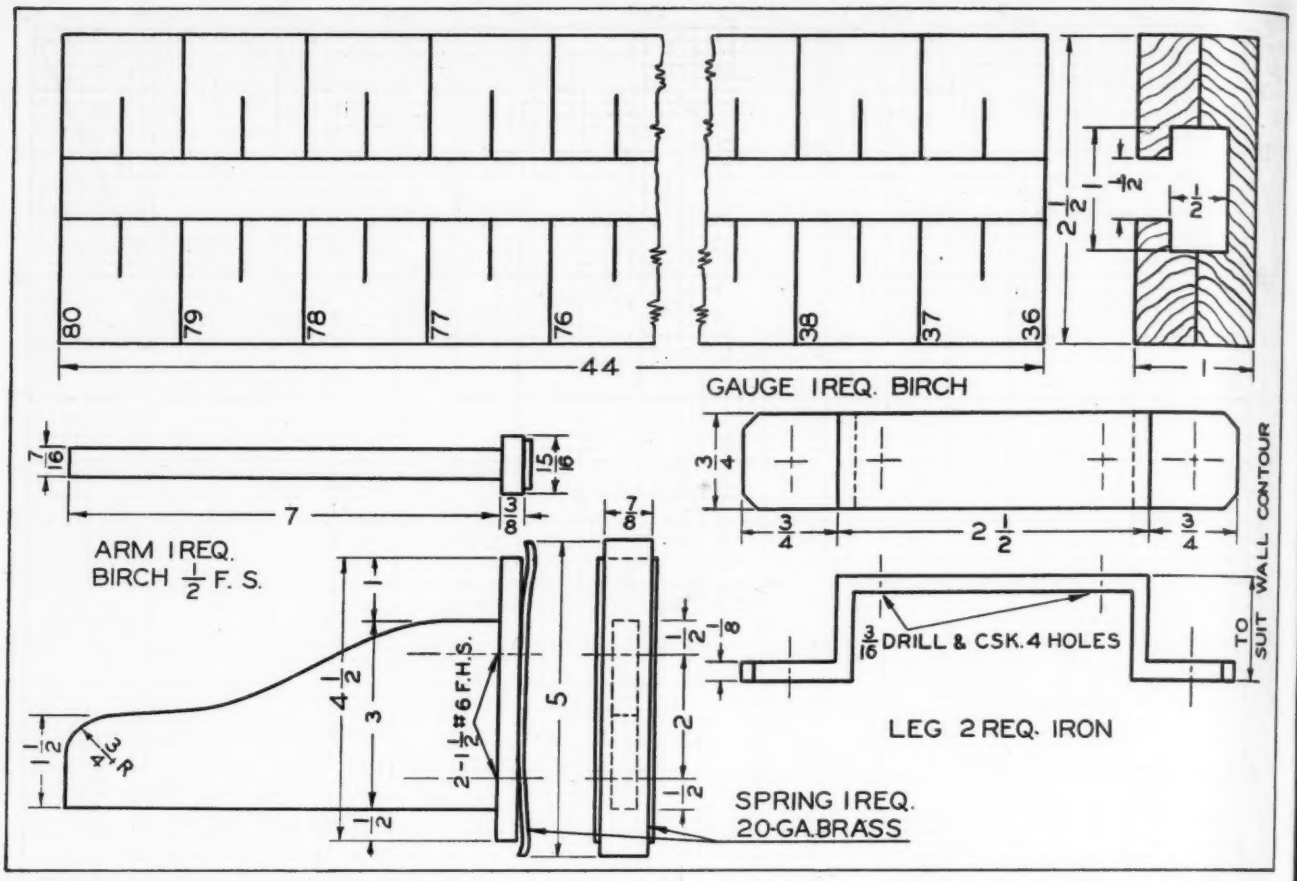
Number expressed logarithmically	*Log of the number*	*The number*
$10^{0.5}$	0.5	3.162.
$10^{0.25}$	0.25	1.778.
$10^{0.125}$	0.125	1.334.

Numbering the curve. Referring to the large scale logarithmic curve shown in Figure 7, it will be noted that the base line readings are the logs of the numbers read on the left hand side.

How to use the curve. For the purpose of the first few exercises the base line may be considered as representing the logs of numbers from 1 to 10 where the log of 1 is 0 and the log of 10 is 1. From the curve it will readily be seen that the logs of selected numbers very closely correspond to those found in the usual log tables. To find the log of 4, for example, refer to 4 on the left hand side of the curve and trace through a parallel to the base line from this point until it touches the curve. Drop a perpendicular by sight when it will be found that the log of 4 is 0.6. In the same way the log of 2.2 is found to be 0.34.

To find the log of a number between 10 and 100. Since the log of 10 is 1 and the log of 100 is 2 it will be obvious that if the left hand numbers on the curve are raised from (0 to 10) to (10 to 100) then the base line numbers or logs will read from 1 to 2 instead of from 0 to 1. Hence the log of 40 will be 1.6 whereas the log of 4 is only 0.6.

To find the log of any number. If the number is between 1 and 10 read the log from the base line figures. If the number is between 10 and 100 add 1 to the base line figures. If the number is between 100 and 1000 add 2



Height gauge for medical department designed by Wm. K. Nevard, Lister-Kelvin Schools, New Westminster, B. C., Canada

to the base line figures. And so on as may be necessary.

Multiplication. To multiply any two or more numbers find the logs of the numbers, add them together and then trace the pathway back from the base line to the curve and from the curve to the left hand numbers by means of a line running parallel to the base line. This is merely the reversal of the process of finding the log of a number.

Division. To divide one number into another find the logs of the numbers and subtract the first named from the second. Find the number corresponding to the log thus determined by the reversed process just mentioned in the foregoing. The number corresponding to the log is referred to in mathematical tables as the antilog, although this word is not mentioned on any of the curves in these notes.

To find the value of a number raised to any power. To illustrate the method a few examples are given.

a) To find the value of $5^{1.2}$.

The log of 5 from the curve is 0.695. Multiply this by 1.2 and the result is say 0.834. From the curve the number corresponding to this log is 6.9. From the log tables the solution is 6.899.

b) Find the value of $5.2^{0.25}$.

The log of 5.2 is 0.715 as taken from the curve. Multiply this by ¼ and the resultant log is say 0.18 and the corresponding number is 1.52. The solution from the log tables is 1.51.

c) Find the value of 71^3.

From the curve the log of 71 is 1.851 and multiplying this by 3 the resultant log is 5.553. Tracing back log 0.553 to the corresponding number it is found to be 3.57. As noted previously a number of between 100,000 and 1,000,000 has to have the number 5 added to the curve base number to obtain its proper log. Hence the correct number corresponding to the log 5.553 will be 357,900. By calculation 71 cubed is actually 357,911 so that it is to be noticed that the error is about 1 in 400.

Characteristic and mantissa. Referring to the foregoing problem, the value 0.553 is called the mantissa and the value 5 placed before the value 0.553 is called the characteristic.

How to deal with numbers less than unity. To illustrate the method a few examples are given.

a) Find the value of 0.02^2.

The log of 2 can be found from the curve but neither the log of 0.2 nor the log of 0.02 can be found in the same way. In the same way as 1 was added to the base number for logs between 10 and 100 so for fractions between (one tenth and 1) one is subtracted from the base number, and for values between (one tenth and one hundredth) two is subtracted from the base number. The characteristic then has a negative value whilst the mantissa has a positive value. The log of 0.02 is expressed in a composite manner. The log of 2 is 0.3 but the log of 0.2 is written $\bar{1}.3$ and is referred to as bar one point three. Also the log of 0.02 is written $\bar{2}.3$ and is referred to as bar two point three. Since the value of 0.02^2 is required then $\bar{2}.3$ multiplied by 2 is $\bar{4}.6$. The antilog of 0.6 is 4, and the characteristic indicates that the fractional value is between $\frac{1}{1{,}000}$ and $\frac{1}{10{,}000}$.

The value is therefore $\frac{4}{10{,}000}$ or 0.0004.

Practice with whole numbers and fractional values will quickly lead to the general rules governing the conversion of log to antilog.

The rules are as follows:

When the characteristic is positive the number of whole numbers before the decimal point is *one more* than that of the characteristic.

When the characteristic is negative the number of ciphers, that is noughts, in the

fractional value is *one less* than that of the characteristic.

b) Find the value of $0.04^{1.5}$.

The log of 0.04 is $\bar{2}.6$. The next stage requires a little more care than was required for the previous problem. $\bar{2}.6$ multiplied by 1.5 should be considered as two problems. The first is that of multiplying the positive mantissa by 1.5 and making sure that there is no necessary resultant modification of the characteristic. The second is that of multiplying the negative characteristic by 1.5.

The answer is $\bar{3}.9$ and the antilog of this log is 0.0079.

c) Find the value of 0.04^{2}.

The log of 0.04 as previously given is $\bar{2}.6$ or bar two point six. Multiplying this by two the resultant log is not $\bar{5}.2$. Dealing with the mantissa and multiplying it by two the answer is 1.2 and it is a positive value. Dealing now with the negative characteristic the answer is minus 4 or $\bar{4}$ (bar four). The sum of these is therefore $\bar{3}.2$. The antilog of this log is, from the curve, 0.0016.

Additional exercises. It has not been considered necessary to extend these notes by including additional exercises as they are to be found in almost every mathematical textbook in use in secondary schools.

A curve with a 20-in. base. If a curve is set out on a 20-in. base and framed with a frosted glass, a very useful aid for the mathematics classroom can be produced at negligible cost. Squared paper should of course be used.

Use of battens for drawing the curve. If no suitable french curves are available thin battens made of wood strips with a cross section of say ⅛ by ⅜ in. will be found very useful.

A LAWN NOVELTY – HUCK FINN FISHING

HAROLD O. AKESON
East Orange, N. J.

This is a simple job that is easily made and takes only a short time to finish. The reproduction of *Huck Finn* is especially adapted to small pools or informal settings in the yard and is different from the usual run of novelties that are offered for sale.

Before starting to trace the job on the board, plan so that all parts will have the advantage of the grain, as much as possible, thereby obtaining the greatest amount of strength which is determined by the grain of the wood.

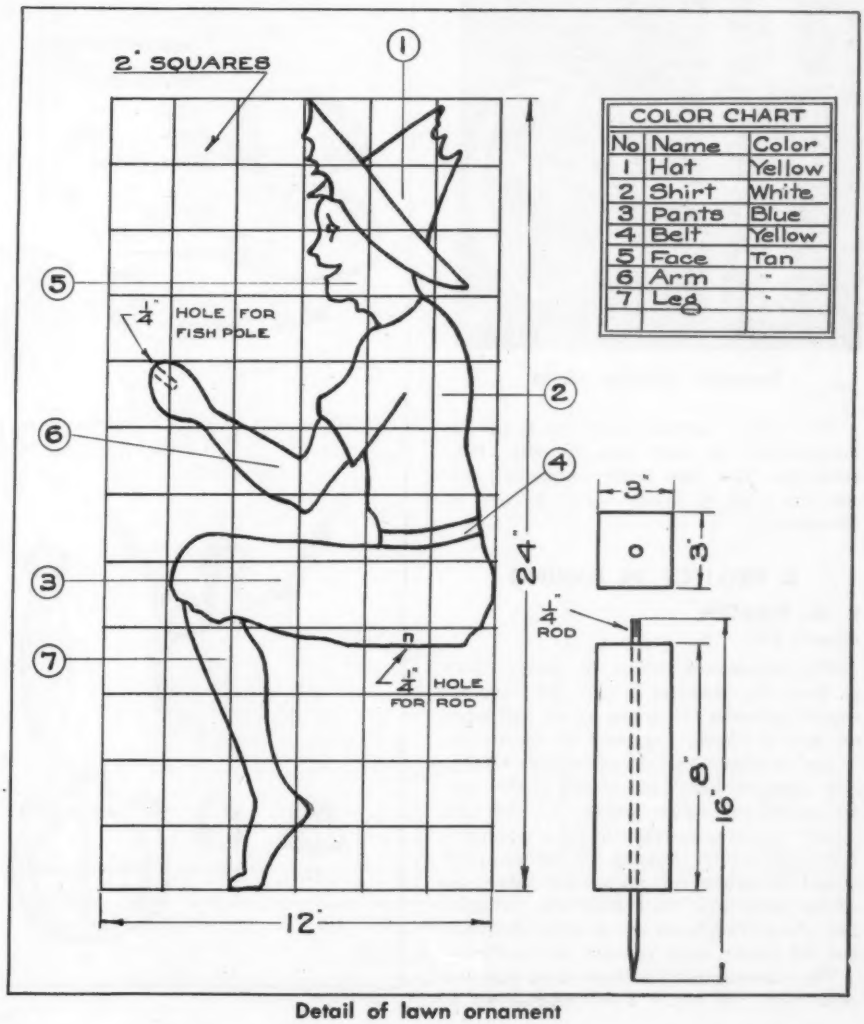
After having traced, or drawn, the outline of the object on a piece of ¾-in. pine or poplar board, saw out the pattern with a hand compass saw, or a power band or scroll saw. A fine power band saw blade would make a clean cut outline so that many of the small curves and difficult places would be more perfect than if it were cut by hand. Smooth all rough edges with file and then sandpaper. By cutting slowly and accurately one can avoid much filing and sandpapering.

The real pleasure in making this project comes in the painting of it. Cover both surfaces and edges with a flat white, or primer, coat of paint. When dry, smooth with fine sandpaper. It is then ready for detailed colors. Paint the hat yellow with the tuft of hair protruding, an orange color. The face, arm and leg, a light tan. Paint the shirt white and the pants blue with a yellow belt. Paint the eye in black with a small pencil brush and the lips red. Be sure to paint both sides and the edges of *Huck*, keeping color on the edges corresponding to the surfaces. Each color should have two coats.

It is necessary to have something for Huck to sit on. Either a box, similar to drawing, or a piece of round kindling wood about 3 in. in diameter and specified length. In either case a ¼-in. iron rod, 18 in. long is fitted loosely through the center of these with one end threaded which will fit into a hole in the bottom edge of the object. The other end of the rod is pointed so it may be easily pushed into the ground.

To make Huck look realistic, a fishing pole, made of ¼-in. dowel, should be set into his hand in a hole previously drilled. Attach a short line to the pole that is weighted at the bottom to make the line taut.

A lawn novelty



Detail of lawn ornament

When the paint has dried, assemble all the parts. Choose a good location for the figure and place it so as to show to good advantage.

PORTABLE PROJECTOR STAND

H. H. ZIEMER
Head, Mechanics Arts Department
High School
Lynwood, Calif.

The illustration, shown herewith, indicates how we solved the transportation problem of our projector. All was constructed in our woodshop except the wheels and axle. These were purchased from a local bicycle shop.

Portable projector stand

The stand is narrow enough so it can be wheeled down the aisle when necessary. Provision has also been made to project well over the heads of anyone sitting in front of the projector.

A PROJECT IN BAKING

E. W. SUDLOW
Miami, Fla.

The Fleischmann School for Bakers, held in Miami by Standard Brands, Inc., and intended primarily for bakers in the southeastern part of Florida, suggested an opportunity to the vocational high school faculty. A fairly large group of boys had enrolled in the regular course for bakers offered by the high school; here was an opportunity to give these lads still further training by having them attend this school for professional bakers. So eleven boys, with their instructor, attended the school. They were not awarded diplomas, but did obtain much valuable information.

The school lasted for three days, with sessions from 2 to 6 p.m. Films were shown on various subjects, and one talking motion picture, in color, was used to illustrate the icing and decoration of cakes. Each session was followed by a discussion.

The school had a model bake shop in miniature, showing the actual placement of equipment for shop efficiency. The boys were required to give this considerable study.

This school was the first to be held in Florida, although similar schools have been set up in different parts of the country, and the instructor of the Vocational School course is enthusiastic over the benefits derived by his boys through their attendance.

INDIAN SILVERSMITHING

BEN HUNT
Hales Corners, Wis.

(Continued from page 212 of the May, 1948, issue)

Miniature Vases and Canteens

The miniature vases and canteens shown in this article are simple to make. They repre-

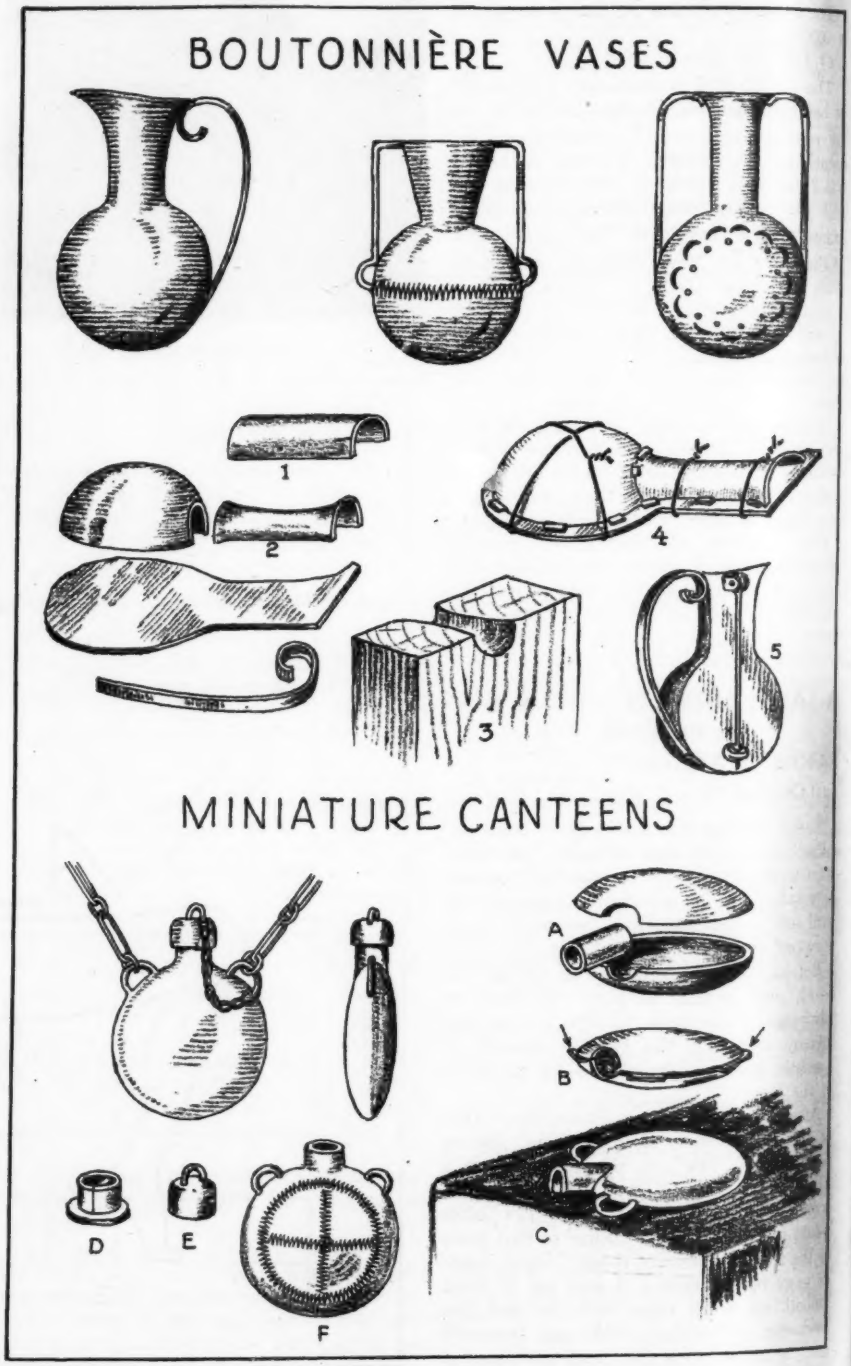
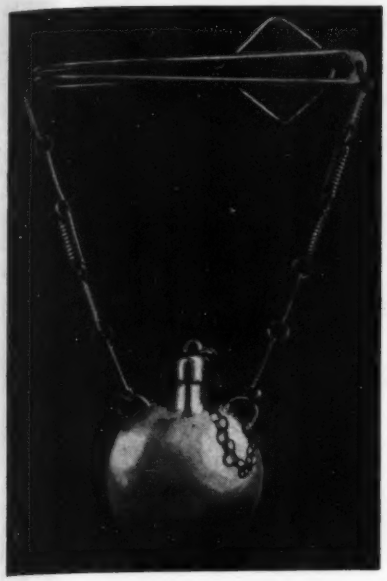


Plate 25



Canteen tie clasp

sent some of the popular modern pieces that the Indians are making nowadays. The boutonniere vases are, as may be seen in the drawings, only half vases, and therefore, not as difficult to make as though they were in the round. Make the half round sphere first, then the neck, which is made of an oblong piece of silver hammered to shape in a form cut out of a piece of hardwood (see at 3, Plate 25). The finished shape of the neck is shown at 2 in the same plate. An opening is cut or filed in the half sphere, and the bowl and the neck are filed to a snug fit. Cut the back larger than the finished piece and wire for soldering as shown at 4. After soldering, cut and file the edges and buff the vase. Then add the handle and solder the pin to the back. The reason for buffing before the handle is attached is that it is easier to polish the section under the handle. The handle is made of a strip of 20-ga. silver but it also can be made of wire.

Sometimes these vases are ornamented with jiggle engraving which is done last, and occasionally stamped ornaments are used. These latter are stamped before forming as is done in making buttons.

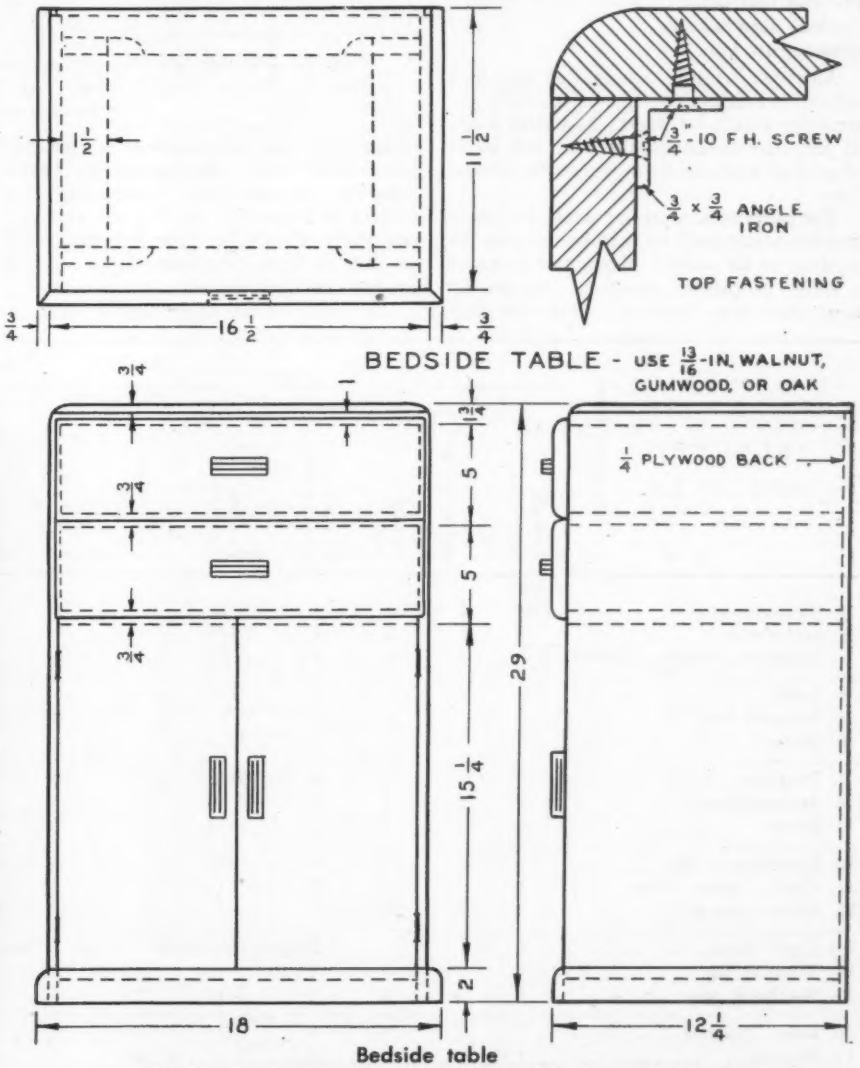
The miniature canteens are used for pendants on necktie clasps. As shown, a plain chain clasp may be used, and the canteen is inserted in the middle of the chain. Solder together the two shallow halves, shown at *A*, Plate 25, with medium solder as when making hollow beads, and then solder the joint in the neck, the neck to the body, and the two loops for the chain, in one operation. To make the job easier, hollow out a block of charcoal, as shown at *C*, so that the neck and loops all lie in one plane. This prevents any chance of shifting. To make the cap, form the cylinder to size and solder it. Then try it for a fit. If too large, make another, and if too small, ream it out to fit the neck. The ring on top was just set in place and soldered as shown at *D* and *E*. A piece of delicate chain should be fastened to the cap and one side loop so that the cap will not be lost. These canteens may also be decorated with jiggle engraving, or with small round turquoise sets. Formerly the Navaho made canteens about 5 in. in diameter for use as tobacco pouches.

Boutonnière

FIRE DRILLS

1. The purpose of the exit drill is to develop and maintain prompt, orderly evacuation procedures. Safety should not be sacrificed for speed.

2. There are no substitutes for actual drills. Perfection cannot be reached with one or two drills. It should be realized that drills will consume time that some parents and teachers might prefer to have used in classwork. How-



Bedside table

Use 13/16-in walnut, gumwood, or oak. Submitted by Louis Barocci, instructor, drafting department, High School, Cudahy, Wis.

ever, it should also be realized that this saved time will be of little value to the children who fail to make a safe exit in case of an emergency.

3. Control of the drill must be absolute. Partial compliance with evacuation regulations will reduce their effectiveness. An uncontrolled drill may become a stampede.

4. The evacuation program must be carefully planned and documented. School officials and school personnel change and in some cases the incoming personnel may not understand the procedures to be followed in exit drills. The plan should be complete, but should not be so rigid that the alert teacher cannot change it to meet special emergency conditions.

The pamphlet on "School Fire Drills" is illustrated with diagrams and contains suggestions for school officials and teachers. Copies of Pamphlet No. 103 are on sale by the Superintendent of Documents, U. S. Government Printing Office, Washington 25, D. C., at 10 cents a copy.

A GENERAL PRINTING PROJECT WORK SHEET

ISRAEL BENSMAN
Printing Instructor
Central High School
Sheboygan, Wis.

Although a large number of our high school printing departments provide instruction sheets, job sheets, and other forms of prepared directions, there are few forms of project work sheets in use at the present time.

The purpose of a project work sheet is to provide a standard form to be used by the student as he selects, plans, and prepares a series of printed projects. The project work sheet is not intended to take the place of operation and job sheets. It is a printed form upon which the student can write complete specifications concerning the project he is working on. A pica-ruled layout sheet should be provided with each project, so that a complete layout of the project can be prepared.

The units on the project work sheet are divided into logical divisions of procedure: layout, composition, imposition and lockup, stock cutting, presswork, and additional bindery operations. The instructor is to check the progress of the student's work, and can place either a check or a grade for each step in the spaces provided for that purpose on the project work sheet.

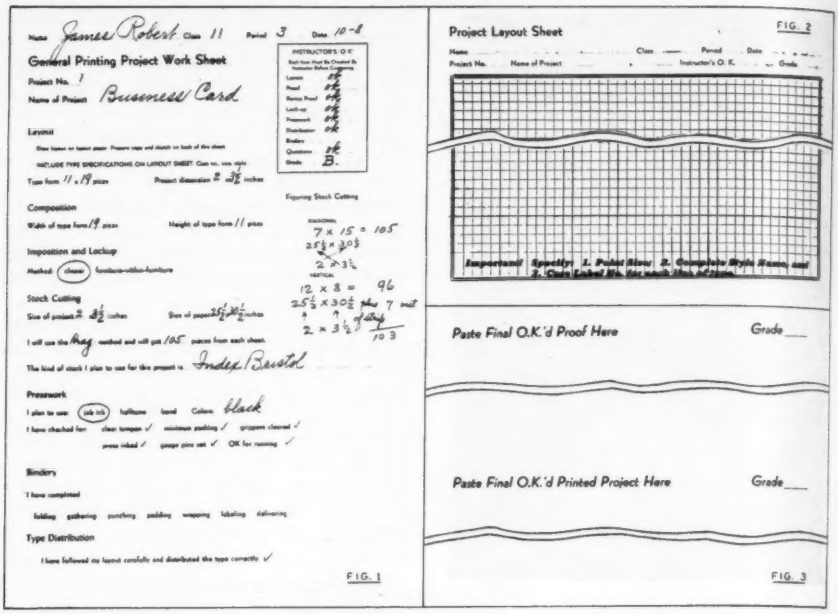


Fig. 1. General printing project work sheet. Original size, 8½ by 11 in.
Fig. 2. Project layout sheet. Fig. 3. O.K.'d proofs. Original size of all of these sheets 8½ by 11 in.

SELECTED PROJECTS — Operation Sheets	Sequence of Operations: No. 1 To make layout	No. 2 To set, dump, and tie up type	No. 3 To take proof	No. 4 To mark and correct proof	No. 5 To clean type form	No. 6 To distribute type form	No. 7 To lock up form	No. 8 To estimate, cut stock	No. 9 To put job on press	No. 10 To regulate Platen impression	No. 11 To set guides	No. 12 To feed platen press	No. 13 To take care of press
1. Business card	Do First	2	3	4	5–13	14	6	7	8	9	10	11	12
2. Letterhead	1	2	3	4	5–13	14	6	7	8	9	10	11	12
3. Statement, invoice, billhead	1	2	3	4	5–13	14	6	7	8	9	10	11	12
4. Label	1	2	3	4	5–13	14	6	7	8	9	10	11	12
5. Personal card	1	2	3	4	5–13	14	6	7	8	9	10	11	12
6. Menu	1	2	3	4	5–13	14	6	7	8	9	10	11	12
7. Program	1	2	3	4	5–13	14	6	7	8	9	10	11	12
8. Announcement	1	2	3	4	5–13	14	6	7	8	9	10	11	12
9. Ticket	1	2	3	4	5–13	14	6	7	8	9	10	11	12
10. Envelope corner	1	2	3	4	5–12	13	6		7	8	9	10	11
11. Check, receipt form	1	2	3	4	5–13	14	6	7	8	9	10	11	12
12. Advertisement	1	2	3	4	5–7	6		*Not Printed on Press*					
13. Color chart	1				Project does not involve use of these operations.								
14. Shipping tag	1	2	3	4	5–13	14	6	7	8	9	10	11	12
15. Notebook cover	1	2	3	4	5–13	14	6	7	8	9	10	11	12
16. Event calendar	1	2	3	4	5–13	14	6	7	8	9	10	11	12
17. Booklet	1	2	3	4	5–13	14	6	7	8	9	10	11	12

Fig. 4. Sequence of operations

A set of questions, based on each project, can be prepared and duplicated by the instructor. As the student completes the project and distributes the type form, he can answer the questions and turn the form over to the instructor for checking.

The work sheet is to be used only as an aid to actual printing instruction by the teacher. It is suggested that the instructor use the following instructional material in addition to the project work sheet:

a) Course of study;
b) Operation and job sheets;
c) Sample layouts and sample printed projects for the students to study for ideas;
d) Question and answer forms for each project;
e) Index chart listing sequence of operations for doing each project;
f) Index chart listing textbooks by page numbers for the student to refer to for additional information on each project.

Figure 1 illustrates the project work sheet; Figure 4, a suggested index chart listing sequence of operations for doing each project; Figure 5, a suggested index chart listing textbook references for each project.

The selection of projects in the index charts were adopted from a course of study in general printing, prepared by Leonard Stolfo and the writer in 1939 at the Stout Institute. This course of study was intended for boys from the 11th and 12th grades who had already received instruction in elementary printing. The foreword to this course of study states: ". . . it is assumed that the student has mastered the basic operations of straight composition and that he is acquainted with the operations necessary to compose type and take proofs, and has received instruction in other phases of elementary work in layout and design, hand composition, imposition and lockup, presswork, bindery and mathematics."

The illustrated project work sheet should be printed up in quantity and made available to the students. A loose-leaf notebook should be kept by each student. The notebook would consist of: a project work sheet for each project; a layout sheet for each project; sheets of paper upon which O.K.'d proofs and the actual project are mounted; and question and answer sheets for the projects.

General Printing Project Work Sheet

Name..... Class.....
Period..... Date.....
.....
Project No.
.....
Name of Project

Instructor's O.K.

Each item must be checked by instructor before continuing.

Layout ..... Presswork .....
Proof ..... Distribution .....
Revise proof .... Bindery .....
Lockup ..... Questions .....
Grade .....

Layout

Draw layout on layout paper. Prepare copy and sketch on back of this sheet.

Include type specifications on layout sheet: Case No., size, style.

Type form: ..... picas
Project dimension: ..... inches

Composition

Width of type form: ..... picas
Height of type form: ..... picas
(*including one slug on top and one slug on bottom*)

Imposition and Lockup

Method: chaser, furniture within furniture
Figuring stock cutting:
Diagonal..... Vertical.....

Stock Cutting

Size of project: ..... inches
Size of paper: ..... inches

I will use the ..... method and will get ..... pieces from each sheet.
The kind of stock I plan to use for this project is .....

Presswork

I plan to use: job ink: ....., half tone: ....., bond: ....., colors: .....
I have checked for: clear tympan ....., minimum packing ....., grippers cleared ....., press inked ...., gauge pins set ....., O.K. for running .....

Bindery

I have completed: folding ..... gathering ..... punching ..... padding ..... wrapping ..... labeling ..... delivering .....

Type Distribution

I have followed my layout carefully and distributed the type correctly.

SELECTED PROJECTS	Pages	*Selected Texts for Instructional Use*					
		ITU Lessons Job Composition Unit III	*The Practice of Printing* Polk	*Composition and Presswork* Mansfield	*ITU Lessons Display Comp.*	*Printing for Apprentices and Journeymen* Witt, Selvidge	*Other Texts*
1. Business card		Lesson 1 1–31	233–236	77, 160 162		78–79, 124	
2. Letterhead		Lesson 2 1–40	224–229	75–76 159		125	
3. Statement, invoice, billhead		Lesson 3 1–26	142			80, 126	
4. Label		Lesson 5 1–14					
5. Personal card		Lesson 10 7–11	234–236	158			
6. Menu		Lesson 7 17–28	249			64–65	
7. Program		Lesson 7 1–13	247–254			54–58	
8. Announcement		Lesson 7 13–17				66–67, 127	
9. Ticket		Lesson 8 1–3	222–223	74			
10. Envelope corner....		Lesson 4 1–31	230–232	78, 161		81	
11. Check receipt form.		Lesson 8 4–6		35		68–70	
12. Advertisement			237–246	90–91	Entire text		
13. Color chart.....			212–217	127			
14. Shipping tag		Lesson 8 13–16				82	
15. Notebook cover....			255–257	112–113		73–74	
16. Event calendar.....							
17. Booklet		Lesson 6 Lesson 9	255–257	86–89, 110		52–53 86–87	

Fig. 5. Texts for instructional use

Project No. 1

Sample of Business Card

Using all 10 pt. Century Schoolbook

Telephone, Lakeside 996

SHEBOYGAN INVESTMENT CO.
Investments and Securities

Franklin Brown — 409 Broadway S. E. Sheboygan, Wis.

Specifications:
Type form: 12x21 picas
Stock: 2x3½ inches

Project No. 2

Sample of Business Card

TELEPHONE, LAKESIDE 996

SHEBOYGAN INVESTMENT CO.
Investments & Securities

FRANKLIN BROWN — 409 BROADWAY S. E. SHEBOYGAN, WIS.

Specifications:
Type form: 12x21 picas
Stock: 2x3½ inches

Project No. 3

Sample of Personal Card

Robert Te Winkle

Specifications:
Type form: 8x18 picas
Stock: 1½x3 inches

Project No. 4

Sample of Calender Book Mark

DECEMBER 1947

ARTHUR H. MENNES

Sheboygan, Wisconsin

Central High School

Specifications:
Type form: 14x44 picas
Stock: 2½x7½ inches

Project No. 5

Sample of Shipping Label

HAUSER'S SPORT SHOP
GOLDSMITH ATHLETIC EQUIPMENT
960 North Eighth Street — Phone 1940

This Package For

POSTMASTER: This parcel may be opened for postal inspection if necessary.
CONTENTS: MERCHANDISE. Return Postage Guaranteed.

Specifications:
Type form: 14x21 picas
Stock: 3½x4½ inches

Project No. 6

Sample of Shipping Tag

TRENARY'S FLOWER SHOP
111 Oak Street CHICAGO

To

Specifications:
Type form: 12x21 picas
Stock: 2½x4½ inches

Project No. 7

Sample of Statement

People's Clothing Store
"The People's Choice"
908 N. 6th St. — Phone 2323-W
Statement, Account of

Specifications:
Type form: 20x22 picas
Stock: 3½x4½ inches

Project No. 8

Sample of Book Mark

Here is
Where I
STOPPED

You Stay Here
to Keep my
Place

Printed by
Floyd Circling

Specifications:
Type form: 10x22 picas
Stock: 2x7 inches

Project No. 9

Sample of Ticket

BASKETBALL
SATURDAY, MARCH 8, 1947
Municipal Armory
Central vs North

Specifications:
Type form: 11x19 picas
Stock: 3x3½ inches

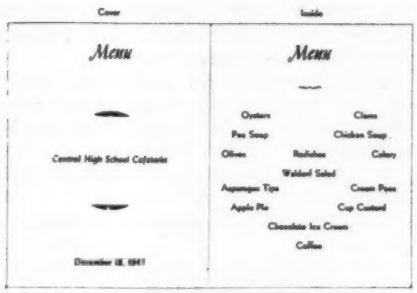
Projects for the print shop. Israel Bensman

Project No. 10

Sample of Two Color Business Card

Project No. 11

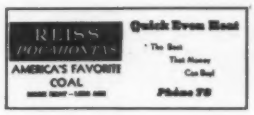
Sample of Menu



These two pages are shown together but are printed separately on the opposite sides of the sheet and then folded.

Project No. 12

Sample of Advertisement



Project No. 13

Sample of Two-Color Motto Card

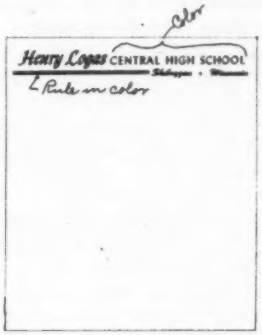
Border and star in red. The rest in color
Gratitude
Is the fairest blossom springs from the soul; and the heart of man knoweth none more fragrant.
–Hasea Ballou

Project No. 14

Sample of Two Color Personal Card

Project No. 15

Sample of Two-Color Memo Pad



Projects for the print shop. Israel Bensman

ELEMENTARY AUTO MECHANICS

FRANK B. MILLER
Central High School
Tulsa, Okla.

(*Continued from page 176 of the April, 1948, issue*)

Motor Parts and Theories

The assignment sheets which follow may be performed in any order most convenient to you but they must all be completed before starting any further assignments.

The foremen and instructor are ready to answer questions but be sure you have read your instruction manual first.

Assignment Sheet No. 6 — Identifying Motor Parts

Purpose: In order to receive instruction and understand the discussions of motors and motor operation, it is necessary to know the name of motor parts.

Procedure:

1. With the motors in the shop as a guide, study the names and *uses* of the motor parts on the three special parts panels. These panels carry the following:

valve
valve spring
valve washer
valve key (one type)
valve lifter (tappet)
rocker arm
push rod
timing gears
timing gears and chain
cast iron piston
aluminum piston
oil ring
compression ring
piston pin
connecting rod
rod bearing cap
ignition points
ignition coil
distributor
distributor cap
rotor
condenser
spark plug

2. List the names and panel numbers of the parts on each panel, and state (in five words or less) the purpose of each part in motor operation.

3. Hand in the three lists.

Questions:

1. What two devices can you use to help fix in mind the names of motor parts?

2. What is the principal source or root of most motor part names?

Text Reference: ....

Assignment Sheet No. 7 — Studying Materials Used in Motor Parts

Why this is done: In order to be able to handle motor parts with sufficient care, and to be able to understand their reaction to motor operation and wear it is necessary to keep in mind the characteristics of the materials of which the different parts are made.

Procedure:

1. With the motors in the shop as a guide, list at least eight different characteristics of materials used in motor parts. Examples: hard, good, electrical conductor.

2. Copy the following list of motor parts, give at least the principal materials each is made of, and give one reason why those materials were used.

oil line	cylinder head
spark plug	high tension ignition wire
piston	spring leaf
cylinder	tire casing
axle	silent timing gear
crankshaft	bearing sleeve
valve	connecting rod
oil pan	piston pin
manifold	piston ring
head gasket	
distributor cap	

3. Hand in the two lists.

Questions:

1. What other factors besides being best suited for the particular motor part would affect the selection of materials.

2. Is long life the only factor?

Text Reference: ....

Assignment Sheet No. 8 — Explaining Piston and Valve Action

Why this is done: The pistons and the valves are two of the most important groups of moving parts of a motor, and their actions in relation to each other must be thoroughly understood before one can intelligently work on a motor.

Procedure:

1. Set up the one-cylinder cutaway motor and study the action of the piston and valves while turning the crankshaft. NOTE: A motor turns over clockwise from normal cranking position, which means counterclockwise on this model when viewed from the cutaway end.

2. Follow each stroke of the piston and note valve action (opening or closing) at all times during each stroke.

3. Draw a chart of four vertical columns, representing the four strokes of a cycle, label each stroke giving name and direction of piston motion, and write in each column at the proper place in that stroke, any valve action that takes place during that stroke.

4. Bring chart to instructor for checking.

5. Correct any mistakes and hand in chart.

Questions:

1. Why do we have three common types of automobile engines today?

2. Which is the best type and why?

3. What do we mean by "four-stroke cycle"?

Text Reference: ....

Assignment Sheet No. 9 — Diagraming Four-Stroke Cycle Engines

Why this is done: In order to understand more easily and to fix in mind the exact relation of parts in the common types of engines, it is decidedly helpful to diagram these parts, using only the simple outlines.

Procedure:

1. Study the motors in the shop, and note the outlines of arrangement of pistons, valves, block, crankcase, and shafts.

2. With these guides, diagram a cutaway and view of each of the three types of engines: (*a*) L-head engine, (*b*) overhead engine, (*c*) V-type engine.

3. Label the diagrams showing the following: (*a*) names of parts, (*b*) direction of piston motion, (*c*) direction of rotation of crankshaft.

4. Bring diagrams to instructor for checking.

5. Correct mistakes and hand in diagrams.

Questions:

1. Why do we have three common types of automobile engines today?

2. Which is the best type and why?

3. What do we mean by "four-stroke cycle"?

Text Reference: ....

Assignment Sheet No. 10 — Checking Motor Part Numbering

Why this is done: The problem of replacing parts in their proper place and position is an important one. Bearings and moving parts become fitted to each other with wear, and that fit must be retained by replacing parts properly. This is a very confusing problem to the beginner until he becomes familiar with the general methods of numbering schemes used in identifying motor parts and their positions.

Procedure:

1. Examine the part group list which follows, using any exposed motors available, and note how the number scheme for each group follows one or more of the following general principles:

a) All numbering indicated by arabic numerals or by markings such as punch or file marks.

b) Each part numbered in sequence as to position, starting with No. 1 as the closest to the crank end of crankshaft.

c) All marks placed on the camshaft side to prevent reversible parts such as bearing caps from being replaced opposite to their original position.

d) All numbers placed in such a position on the part so as not to interfere with its operation or weaken its construction.

NOTE: This limitation prevents numbering some parts, such as piston pins and piston rings, in which cases great care must be taken to return them to their proper place.

e) Where the numbers in a single group get very high, an orderly grouping of marks is resorted to for easy reading, such as valve marks in groups of fives with each group in a straight line.

2. Using the foregoing general principles, indicate which of the following parts are marked, where and how they are marked, and, if unmarked, why:

valve	connecting rod cap
valve lifter	connecting rod
valve lifter cluster	piston
overhead push rod	flywheel
bearing shim	piston pin
main bearing cap	piston ring

Questions:

1. In disassembling a motor, when should the markings of a group of parts be checked?

2. What should you do if you find a set of valves unmarked?

3. What method could you use to replace unmarked piston rings correctly?

4. Should a series of bolts be marked? Why?

Text Reference: ....

ART-METAL TRAYS

AUGUSTINE J. BREZINA
Oswego State Teachers College
Oswego, N. Y.

These four art-metal projects of the tray variety involve interesting procedures. They are low in cost, possess good design lines, have utility, and can be made in a relatively short time. The projects are student tested because they have been made successfully by seventh- and eighth-grade boys and girls. The trays are intended to introduce metal-shop work and in each project considerable allowance is made to permit individual design variations. As introductory metal-shop projects the following processes are covered: design, layout, forming, peening and planishing, drilling, soldering, riveting, filing, polishing, buffing, annealing, antiquing, and lacquering.

For ease of construction by young students all the projects are based on the form block method whereby the peened metal is sandwiched between two hardwood form blocks, which in turn are held securely by the vise and C clamps. It was found that with younger students the use of a single form block was insufficient, inasmuch as they lack the necessary strength and co-ordination to hold the work on a single block and shape the project as well. By clamping the work as a unit in a vise, both hands are free, the work is secure, will not slip while being formed and consequently a better job of forming may be obtained. Then again too many projects are first formed and then the peening or planishing is attempted, resulting in difficulty by the student in hammering irregular and formed surfaces. Thus it becomes quite simple for the student to take a flat piece of metal of the desired shape, peen or planish it all over, and then form it. In this series of projects, a flat piece of metal cut in the shape of the desired job, is easily and carefully peened or planished, annealed, pickled, cleaned, and placed between the form blocks after which the sides are formed. After forming to shape, the desired appendages such as the handles are added. For interesting effects some of the trays were constructed with twin handles, or the handles may be of contrasting metals for added variety. Tubular or solid rod materials may be used successfully for the handles as well.

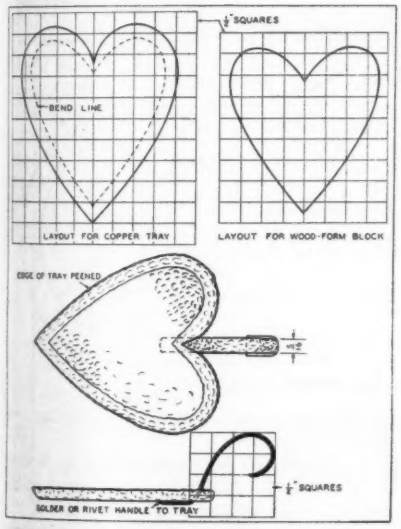
In doing the art-metal work with the sev-

enth- and eighth-grade students, it was found that the conventional metal-shop tin snips were much too large, too heavy and cumbersome for the average student. Hence a pair of jeweler's snips were employed which cut soft metals up to about 16 gauge. They are light, fit the student's hand more easily, and enable the students to do even difficult cutting on their own.

It is interesting to know that the industrial application of the form block method is used extensively in the aviation industry, in forming odd shapes for airplane structures, especially in experimental and prototype aircraft where many of the parts must be made by hand. The work is done in a similar manner employing the form blocks, vises, and clamps to hold the material while the workman shapes the annealed material into the desired structural part.

Heart Tray

The heart tray is perhaps the simplest of the set, and was specifically designed as a St. Valentine day gift project. The timing of the project for that special occasion aroused the spirits and interest of the students, adding to the usefulness of the tray. It may also be used as an ash tray, candy tray, or if provided with a socket may be converted into a small candleholder. The type of handle may also be varied either as in the diagram or a spiral, as well as using flat, tubular, or solid rod material for the handle.



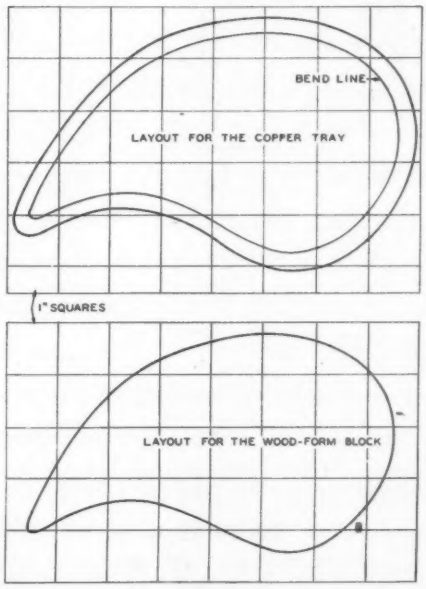
Art-metal heart tray

Procedure

1. Cut out a metal blank of the desired size of 20-ga. copper, file the edges smooth and remove all tool marks.
2. Cut out the hardwood (maple) form blocks and sand to a smooth finish, slightly rounding the edge of the block over which the tray will be formed.
3. Peen the edge of the tray completely around with a large ball-peen hammer.
4. Peen the tray all over with a medium hammer maintaining a uniform hammer blow.
5. Anneal the peened copper, and then plunge into a pickle bath to remove the scale.
6. Wash the solution off, and brighten with steel wool.
7. Sandwich the piece carefully between the form blocks, clamp in a vise, and begin to set the edge down with a mallet.
8. Obtain a piece of 20-ga. copper, 3/8 in. wide and about 5 in long, for the handle.
9. For a contrasting effect use a small ball-peen hammer, to produce very small peen marks on the handle.
10. The handle may then be soldered to the tray, after which it is buffed and lacquered.
11. If the handle is to be riveted to the tray the parts are first cleaned and buffed, the holes drilled, parts lacquered and then assembled.
12. For variety in projects the handle may be tubular, flat stock, or solid rod. An antique finish may also be applied with liver of sulphur, and then high-lighted.

Leaf Tray

The leaf tray is somewhat larger than the heart tray, and although the tray was planished instead of peened the basic procedures are somewhat the same. The tray may find use as a candy or cookie tray, or simply as a table ornament. Once again the handle may be varied by being constructed of different type of material as in the heart tray.



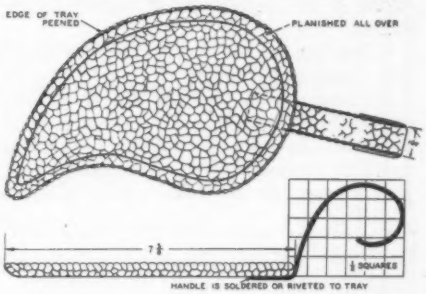
Art-metal leaf trays

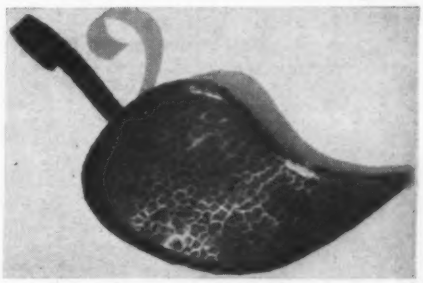
Procedure

1. Cut the metal blank out of 20-ga. copper, file the edges, and remove all tool marks.
2. Cut the form blocks out of hardwood such as maple. The edge over which the edge will be formed should be slightly rounded and all surfaces should be sanded smoothly.
3. The edge of the tray was first peened with a large ball-peen hammer, overlapping each hammer mark slightly.
4. The over-all surface of the tray is then planished with a medium sized planishing hammer. The hammer marks are overlapped slightly to eliminate any undesirable islands on the surface.
5. The tray is then annealed in a gas flame and then plunged into a pickle solution to remove the scale.
6. Wash with water and then brighten with steel wool.
7. The planished piece is then placed between the form blocks, and since it is an irregular shape it will be necessary to use additional C clamps along the outer surface of the form blocks for greater holding power while forming.
8. Set the edge down with a mallet and work carefully at the tip of the tray to prevent buckling.
9. Secure some copper material for the handle, planish it, polish it, and secure it to the tray either by soldering or riveting.
10. The tray may be given a bright lustrous finish by buffing or may be antiqued by using liver of sulphur, and then applying two coats of metal lacquer after it has been high-lighted.

Candy Tray

This attractive twin handled tray serves well for candy as well as for cookies, and will find real utility in any home. Although the twin handles are made of sheet copper decorated with small peen marks, copper

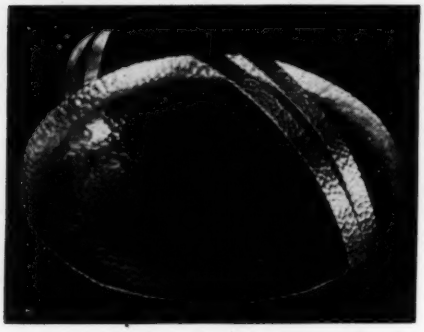




tubing or German silver would also go well with the project. The basic construction is the same as in the other trays.

Procedure

1. Cut out a metal disk of 20-ga. copper and trim the edges, and remove any scratches prior to peening.
2. For the form blocks two hardwood disks are employed, both of which are finished smooth prior to using.
3. The outer rim of the tray is first peened with a large ball-peen hammer.
4. Peen the tray all over with a medium



Candy tray

hammer. Work in concentric circles from the outside toward the center of the tray. If buckling occurs, flatten the material from the opposite side with a mallet and then finish peening.

5. Soften the tray by annealing in a gas flame, and then plunging in a pickle solution to remove the scale.

6. Clean with water and polish with steel wool.

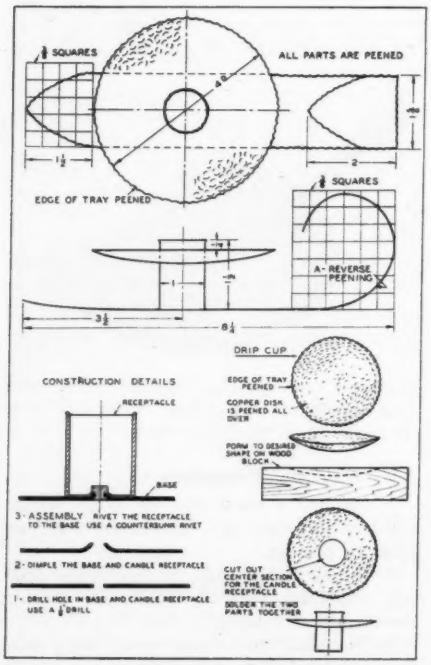
7. Place the peened copper between the form blocks in a vise, and set the edge down.

8. For the twin handles two strips of copper ⅜ by 10 in. are required. Once again for contrast a small peening hammer should be employed to produce small marks on the handles.

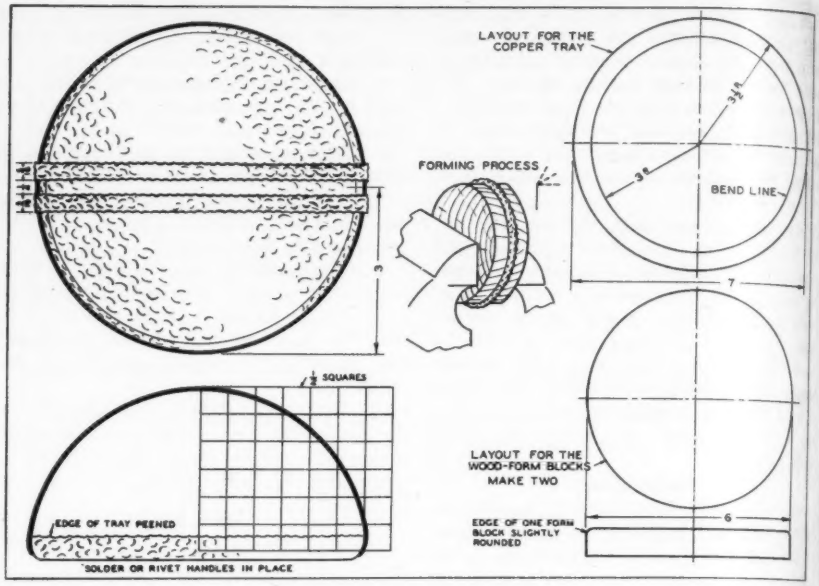
9. The handles are attached to the basket with small copper rivets.

10. Both the tray and the handles are finished, polished, buffed, and lacquered prior to assembly, inasmuch as difficulty in buffing would be encountered after assembly.

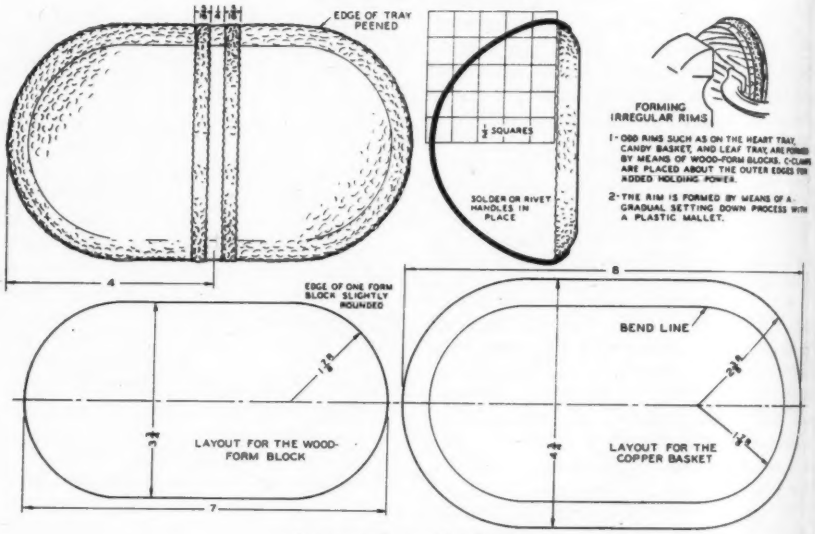
11. Copper or aluminum tubing, German


½ SQUARES
ALL PARTS ARE PEENED
EDGE OF TRAY PEENED
A- REVERSE PEENING
CONSTRUCTION DETAILS
RECEPTACLE
BASE
3- ASSEMBLY RIVET THE RECEPTACLE TO THE BASE USE A COUNTERSUNK RIVET
2- DIMPLE THE BASE AND CANDLE RECEPTACLE
1- DRILL HOLE IN BASE AND CANDLE RECEPTACLE USE A ¼ DRILL
DRIP CUP
EDGE OF TRAY PEENED
COPPER DISK IS PEENED ALL OVER
FORM TO DESIRED SHAPE ON WOOD BLOCK
CUT OUT CENTER SECTION FOR THE CANDLE RECEPTACLE
SOLDER THE TWO PARTS TOGETHER

Colonial candle holders


LAYOUT FOR THE COPPER TRAY
FORMING PROCESS
BEND LINE
½ SQUARES
EDGE OF TRAY PEENED
SOLDER OR RIVET HANDLES IN PLACE
LAYOUT FOR THE WOOD-FORM BLOCKS MAKE TWO
EDGE OF ONE FORM BLOCK SLIGHTLY ROUNDED

Art-metal candy tray


EDGE OF TRAY PEENED
½ SQUARES
SOLDER OR RIVET HANDLES IN PLACE
FORMING IRREGULAR RIMS
1- ODD RIMS SUCH AS ON THE HEART TRAY, CANDY BASKET, AND LEAF TRAY, ARE FORMED BY MEANS OF WOOD-FORM BLOCKS. C-CLAMPS ARE PLACED ABOUT THE OUTER EDGES FOR ADDED HOLDING POWER.
2- THE RIM IS FORMED BY MEANS OF A GRADUAL SETTING DOWN PROCESS WITH A PLASTIC MALLET.
EDGE OF ONE FORM BLOCK SLIGHTLY ROUNDED
LAYOUT FOR THE WOOD-FORM BLOCK
BEND LINE
LAYOUT FOR THE COPPER BASKET

Art-metal candy basket

silver or brass will be found suitable for making attractive handles for the tray.

Candy Basket

This twin-handled candy basket is an outgrowth of the round candy tray and may find equal utility in the home. It was designed to meet the need of added variety in these tray type projects.

Procedure

1. Cut out an oval piece of 20-ga. copper of the desired shape, trim the edges and remove any tool marks or scratches.

2. Cut out two hardwood form blocks as shown. Round the top edge of one and sand both to a smooth finish.

3. Peen the edge of the oval blank.

4. Peen the entire surface of the oval with a medium hammer. It is best to work from the outside toward the middle of the piece. If buckling occurs, flatten with a mallet, and finish the peening.

5. Anneal the hardened basket by heating in a gas flame and then plunge into a pickle bath to clean off the oxide and scale.

6. Wash the pickle solution off and brighten the surface with steel wool.

7. Place the material between the form blocks and set the edge down. Use additional C clamps around outer edge.

8. For the handles two strips of copper ⅜ by 9 in. will be required. Use the small hammer to peen the handles all over.

9. Polish and buff both the basket and the handles, and then apply two coats of metal lacquer.

Assemble by riveting the handles to the basket, or they may also be soldered if so desired. The handles also may be made of other types of materials.

A Creed

For the Industrial Arts Teacher

I WILL attempt to maintain physical and mental fitness; and emotional stability. I will strive to work harmoniously, efficiently, and effectively with others. I will be motivated in my work by a sense of fairness, by honesty, justice, and patience. I will sustain and extend my interest in youth; and try to understand the problems of young people and to help solve them. I will organize and maintain an attractive and suitable laboratory or workshop for my students; and at all times will keep the tools, equipment, materials, and supplies in good working condition and in a systematic order. I will develop a functional type of teaching program which is related to daily living. I will analyze, organize, and keep current my teaching materials and subject-matter content. I will acquire, develop and maintain current related technical information, including audio and visual aids, to supplement manipulative activities. I will encourage individual initiative and progress; and permit students to advance in accordance with their abilities and interests. I will assist and guide my students in the selection, design, and creation of projects which possess artistic merit and represent good craftsmanship in construction and finish. I will inculcate the necessity for acceptable standards of workmanship, the joy of creation, the dignity of labor; together with an appreciation and respect for the products of our workers, especially those who work with their hands. I will endeavor to grow and progress professionally and to give, within my ability, of my time, effort and financial support for the furtherance of my profession and its associated activities.

HEBER ALLEN SOTZIN

"A Creed for the Industrial Arts Teacher," by Heber Allen Sotzin. Designed by Perry L. McIntyre, supervised by Hartley E. Jackson, Associate Professor, Industrial Arts Education, San Jose State College, San Jose, Calif.

Association News

♦ The Twentieth Anniversary Convention of the Michigan Industrial Education Society was held in Grand Rapids, April 8, 9, 10. Convention headquarters were in the Pantlind Hotel with commercial and school exhibits in the Grand Rapids Civic Auditorium. The program was under the direction of Dr. Frank Dalton, general chairman, Maurice Overholt, local chairman, and Roy Chamberlain, exhibits manager.

The number of exhibits exceeded that of any previous convention, and attendance was nearly double that of recent years. The theme of the convention was, "Industry Co-operates with Education" and leaders from industry, labor, and education took prominent parts in discussion meetings.

Earl L. Bedell, director of vocational education, Detroit, was chairman of the General Session on Thursday evening. The topic, "The Role of the Superintendent in Administration of a Program of Adequate Vocational Preparation" was discussed by a panel consisting of members of the Michigan Council for Vocational Education Administration, including school administrators from Allegan, Ecorse, Marshall, and several other cities. At the convention breakfast on Friday morning, of which Joel W. Lee, vice-president, M.I.E.S., was chairman, a brief but exceedingly interesting talk was given on the subject, "Human Relation in the Air Age" by Colonel Lester C. Doerr, director of instruction, Public Schools of Grand Rapids.

A lively and stimulating program was offered at the 9:00 a.m. General Session of which Claud Bosworth, President, M.I.E.S., was chairman. The theme of the program was, "Schools and Industry Co-operate." Short talks appropriate to the topic of the meeting were made by Julius Schippers, superintendent of schools, Middleville, W. C. Patterson, vice-president public relations, Michigan Bell Telephone Company, and Dwight Rich, superintendent of schools, Lansing. The discussion period brought out several ideas and proposals for increasing co-operative relations between education and industry.

The Town Hall Meeting, Earl L. Bedell, chairman, was devoted to discussion of ways in which individual members might contribute to the programs of the M.I.E.S. and activities the Society might engage in for the greater benefit of members. Several worth-while recommendations developed as a result of the discussions.

Large attendance was reported for all of the division meetings at 3:00 p.m. The speaker for the Industrial Arts Education Division was Dr. Fred Strickler, dean of industrial arts, Bradley University, Peoria, Ill. His topic was, "The Contribution of Industrial Arts to General Education." The subject, "What the Trade and Industrial Teacher Can Do to Better Human Relations in Industry" was discussed at the Trade and Industry Division Meeting. Leaders from industry, labor, and education were members of the panel, and the deliberations brought out the need of youth for a better understanding of industrial economic problems.

Music for the annual banquet at 6:30 p.m. was provided by the South High Ensemble under the direction of Glen B. Litton. Honorary life memberships were presented by Arthur L. Reagh, executive secretary-treasurer, M.I.E.S., to Arman Kurkijian, for many years sales representative of the Oliver Machinery Co., Grand Rapids; and Harold J. Van Westrienen, chief of the Division of Trade and Industrial Education, State Board for Control of Vocational Education, Lansing. The toastmaster, C. W. Bemer, superintendent of schools, Muskegon, introduced C. L. Greiber, director of Vocational Education for the State of Wisconsin and past president of the American Vocational Association who brought greetings from that organization, and Dr. Lee M. Thurston, deputy superintendent of public instruction who extended the well-wishes of the State Department of Public Instruction.

In his address, "Education Today" the principal speaker, Frank C. Moore, director of industrial arts, city of Cleveland, stated that he liked to classify the objectives of industrial arts under just two headings: (1) specific skills, and (2) ideals. He referred to the ideals which included appreciations, good human relations, citizenship, health, understanding, and others as the "plus in education." The program closed with entertainment entitled "Showboat" including songs and dancing by the Union High School "Frolliets" directed by Miss Dolores Whittaker.

The Saturday morning program was devoted to round-table meetings arranged by Dr. John L. Feirer, Co-ordinating chairman of research committees. The convention closed with the Ship's luncheon in the ballroom of the Pantlind Hotel. James Lewis, superintendent of schools, Dearborn, was toastmaster. The speaker, Colonel Karl Detzer, roving editor, *Reader's Digest*, recounted exciting experiences as an intelligence officer during the war and emphasized the obligations and opportunities of educators in the present struggle to preserve the democratic way of life.

Results of the election of officers for 1948–49 were announced and Joel W. Lee, supervisor of industrial education, Owosso, was chosen president, and Roland R. Fraser, Washington Trade School, Detroit, vice-president. Arthur L. Reagh, director of industrial education, Grand Rapids, is executive secretary-treasurer. — *Ward D. Sager*, Assistant Secretary, Michigan Industrial Education Society.

♦ The annual spring initiation of members to Epsilon Pi Tau, Phi Chapter, was held on Saturday, April 10, at the Oswego State Teachers College, Oswego, N. Y. Thirty-eight candidates were initiated into the chapter.

The formal initiation was held in the College industrial-arts library. The initiating team was composed of Arthur Darcy as the Honorable Basileus, Glenn Hess as Historiographos, Earl Hay as Texnikh, Earle Spaar as Pragmatein, Frederic Ford as Exetasis, Roger Pratt as Hegemon, and Arthur Crossman as Phylax. The ceremony concluded with an address by Dr. Gordon O. Wilber, sponsor of the fraternity. He spoke on the fraternity's objectives, history, and organization, and presented a challenge of responsibility to the incoming members.

Following the initiation ceremony at the college, a formal banquet was held. The program was led by President Arthur Darcy who served as toastmaster for the banquet. Dr. Thomas R. Miller, dean of the College, spoke briefly in honor of the occasion. Earl Hay followed with the introduction of the 38 initiates. William E. Huss, co-sponsor, then spoke in praise of the initiating team. The guest speaker of the evening was Dr. Harvey M. Rice, president of the College. Dr. Rice presented a timely and challenging address on the subject "Problems in Teacher Education."

Epsilon Pi Tau initiates of Phi Chapter at Oswego State Teachers College, Oswego, N. Y., on April 10, 1948.

Front row: Russel Linger, Sid Ayers, John Day, Harvey Handel, Dr. Cecil Hutchcroft, Roy Christian, Roger Wilson, and Al Johnson.

Second row: Henry Yost, Guide Valentine, Charles Williams, Al Castiglia, Edward Myslivechek, Ellsworth Emmett, William Jewett, and Robert Holl.

Third row: Murray Wilkow, Wilfred Lagoe, Arthur Lieneck, Herbert Beyea, Joseph Murray, Vincent Waryha, John York, George Jaeger, and George Parker.

Fourth row: Donald Terwilliger, Herman Koenig, Charles Coward, Robert Elting, William Reynolds, Kenneth Measeck, Ralph De Mas, Richard Muller, Charles Easterbrook, Albert Hoefer, Norman Gurley, David Kidd, and Ernest White.

♦ The 16th Annual Convention of the Indiana Industrial Education Association was held at Turkey Run on April 15, 16, and 17, 1948.

The officers elected for the following year are: president, W. C. Baker, 722 Sixth St., Columbus, Ind.; vice-president, Gordon Johnson, Shortridge High School, Indianapolis, Ind.; secretary-treasurer, H. G. McComb, 215 State House, Indianapolis, Ind.

The registered attendance was about 500 this year. This was much larger than last year, and the exhibits also exceeded any that we have had in the past.

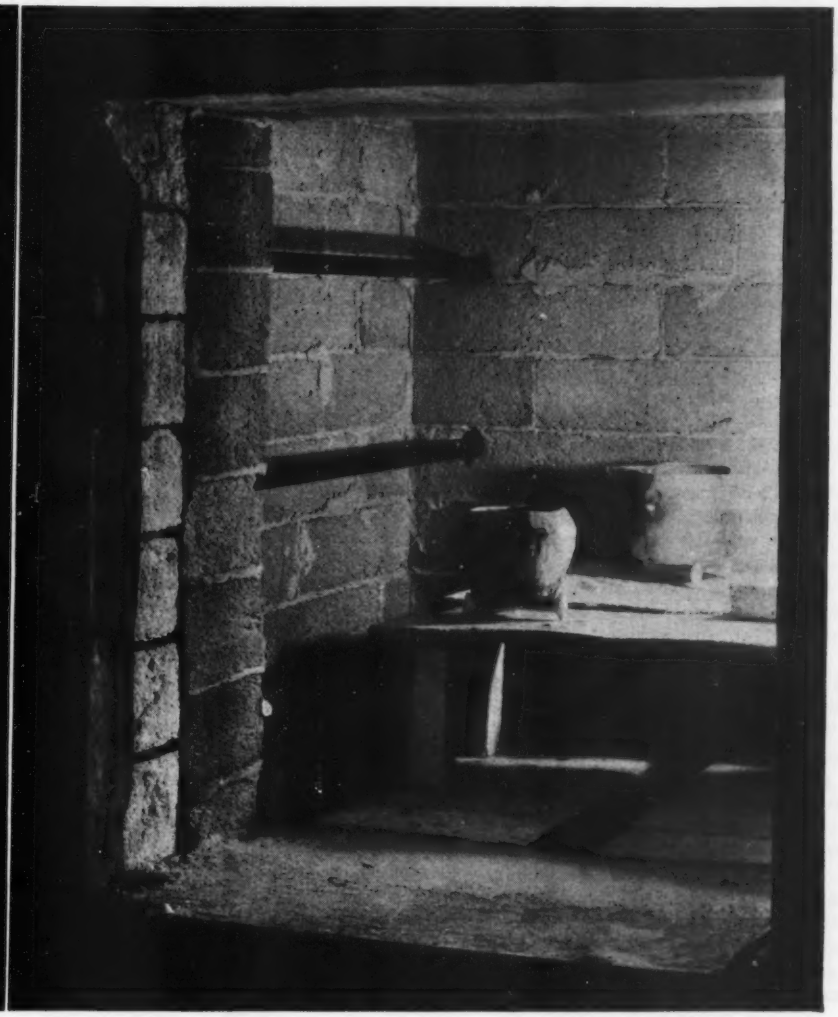
The high lights of the program were a demonstration on silversmithing by Dewey F. Barich, head of industrial education, Kent State University, Kent, Ohio, and a demonstration on aluminum in industrial arts by Douglas B. Hobbs, Aluminum Company of America, Pittsburgh, Pa. There was a teaching demonstration by Aaron Adams, instructor of drafting at Marion, Ind.

The association issued awards of merit, as teachers of industrial arts, to James Neckar of

(Continued on page 12A)

GLOBAR
TRADE MARK
ELECTRIC KILN does double duty

In one season, more than 100 Adults and 75 Students receive instruction in Ceramic Art at Geneva (N. Y.) High School.



CERAMIC FIRING SIMPLIFIED

Because the heat provided by GLOBAR non-metallic electric elements is dependably uniform, most biscuit and glazed pieces come through firing in excellent condition according to Cal P. Gregway, Director of Vocational Education at Geneva.

Adding further to the popularity of this ceramic art course is the complete absence of noise, dirt, fumes and explosion dangers associated with complicated fuel fired equipment. Absolute safety to students, instructors and school property is assured.

Compact electric kilns, equipped with GLOBAR heating elements, are receiving increasing attention for ceramic instruction. It makes good sense to obtain complete details. They are easy to get through Department Y-68, The Carborundum Company, GLOBAR Division, Niagara Falls, New York.

GLOBAR Heating Elements BY CARBORUNDUM
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INDUSTRIAL-ARTS RECORDS

ROLAND O. BYERS
Assistant Professor of Engineering Drawing
University of Wichita
Wichita, Kans.

It is generally conceded that no organization can run efficiently without accurate and efficient records. These records may be used to determine future purchases, the amounts of materials needed, where the best service is given, from whom discounts can be obtained, how much materials are on hand, to whom tools and equipment have been loaned, and many other items.

It is probable that many industrial-arts instructors are using an inefficient accounting system or no accounting system at all. The principal fault with most accounting systems is that too much time is needed in the keeping of records, and this becomes a burden, a very unnecessary burden on the instructor. As the primary duty of the instructor is the instruction of his pupils, why should he enslave himself with an inefficient accounting system which consumes so much of his time that the interests of his pupils are neglected.

It is important that a complete and accurate record be kept of all materials, equipment, tools, supplies, and money which are involved in the pursuit of education. Too often instructors neglect such matters until the end of the school term, and then in a few hours try to do all the work needed to complete the records. This is not only inefficient and inaccurate but also indicates to his superiors that the instructor is dilatory. An efficient financial accounting system gives the instructor a clear and concise view of his work, promotes confidence for him with the administration of the school, and makes his work easier, leaving more time for the instruction of his pupils. People handling public funds are always open to criticism as to the disposition of these funds. The instructor should be prepared to show the disposition of all funds at any time.

A good accounting system will be beneficial to the pupils as they learn thereby how to keep accounts, and they discover also that accurate and concise records must be kept by any business organization if it is to be successful.

Another important feature of keeping a good accounting system is for the benefit of the parents, who like to know that the money which they give their child for materials which he or she uses in the shop is being properly administered.

Most of all the instructor needs a good accounting system. If he is to run his shop efficiently he must have records of all the materials that he buys. From this record he will be able to compute the price which he must charge his students for the materials which they use. The shop runs on a nonprofit basis, and unless the instructor has an efficient accounting system, he will not have an accurate way of determining whether he is overcharging or undercharging the pupils.

The price which the instructor charges the pupils for the materials they use, must include not only the cost of the material but also the waste and other charges which are incurred in transportation and handling.

Definition

Of the several types of financial accounting systems now in use many have advantages as well as disadvantages.

A system used in many schools is that of requiring the pupils to purchase their own materials for the project which they are making. The school using this system needs to keep on hand only limited stores, such as nails, screws, glue, and finishes. Such a system has the advantage that the instructor need not keep a record of stores but only a limited number of accounts. The pupil has the experience of computing and purchasing the material which he needs for his project, but often he is unable to obtain all the required materials, and will be unable to compute the cost of his project. During this delay the instructor is forced to find something else for him to do. The pupils of the school using this system get the knowledge of the value of materials but do not get the valuable experience of keeping accounts. The disadvantages of the system probably outweigh the advantages.

A system used somewhat less than the one just mentioned is where the school pays for all the materials and stores which the pupil uses. The pupil is also allowed to keep the completed projects without any cost to himself. This system requires no accounting system on the part of the instructor.

The pupils do not get the valuable experience of keeping accounts neither do they have the chance to learn of the value of material, stores, and tools. These features are an important part of the pupils' education in the school shop.

A system of accounting which is more commonly used than those already mentioned is the following: The school purchases all of the materials used in the shop as they are needed. The instructor determines the value of the materials used by the individual pupils and collects that amount from him. At the conclusion of the school term the instructor turns over the receipts of the school year to the superintendent, who turns it over to the board of education. The money passes through several hands and no accounting is made of it at any time. Were this disadvantage corrected this plan would be a fairly good plan providing the pupil, with the aid of the instructor, computed a bill of material and also made some record of the transaction.

Another system of accounting which is not as commonly used as the others named is the meal ticket system. Where this method is used the school furnishes all the materials. Receipt of these materials by the pupil is recorded by the instructor by punching from the card the cost of the material which has been issued to the pupil. The disadvantage of this system is similar to the second one described in that the course loses part of its value for it will not give the pupil any experience in keeping accounts. This plan, however, has the advantage of saving the instructor much time in keeping accounts.

To measure and evaluate properly the advantages and disadvantages of the various systems of financial accounting, requires some kind of a measuring stick.

A good and efficient financial accounting system must:

1. Utilize simple forms.
2. Account for all money.
3. Account for all materials and supplies.
4. Must satisfy administration that all money is accounted for.
5. Must satisfy parents. Can the parent tell as to the disposition of the money that is given to the children.
6. Give the teacher an accurate system of accounting for all materials, money, and supplies.
7. Teach the student the value of system in handling money and materials.
8. Teach students how to use business forms.
9. Have few forms.
10. Teach the student how to transact business in a businesslike manner.
11. Be so constructed that balances may be readily available.
12. Not take up too much time to keep records.

A Simple, Efficient Record System

The need of the instructor to have a simple, efficient accounting system is met in the following paragraphs. It includes the following forms: (1) continuous stores record, (2) student requisition slips, (3) parent notification form, (4) deposit slips, (5) inventory forms, (6) ledger.

This system conforms generally to the 12 criteria which were set up for an efficient, simple financial accounting system. The forms are simple and can very easily be taken care of by the student. The system accounts for all the money, materials, and supplies. It will satisfy the administration because it does take care of all the money and other aspects of the shop efficiently. The parent of the student is notified of the amount of money it will take to pay for the projects he is making. The system is accurate and efficient and the student will learn the value of a system by his participation in the keeping of the record and business forms. The system has only six forms of which the instructor keeps only two.

Method of Conducting System

The student deposits a fixed fee at the beginning of the school year with the treasurer of the school. He will make out a deposit slip which is available for that purpose, one for himself which is marked *duplicate* and one for the treasurer's office.

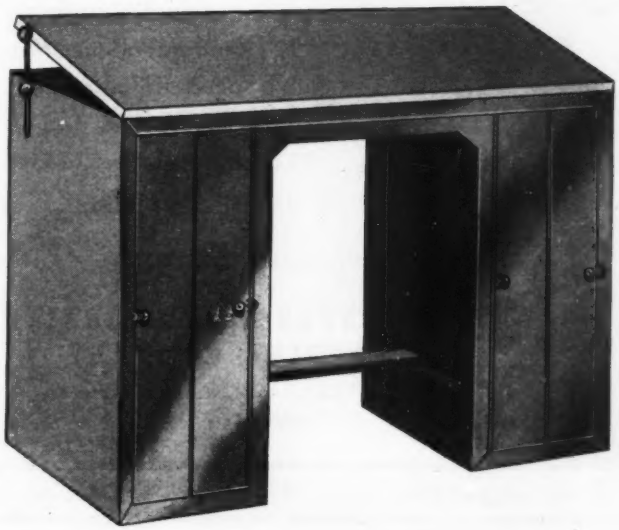
When checking out materials and supplies for a project, the student makes out a requisition slip containing the materials needed

(Continued on page 12A)

NOW AVAILABLE...

ALL-STEEL DRAWING TABLE

WITH LOCKER SPACE FOR 4 STUDENTS



This all steel regulation size drawing table is finished in Lyon green enamel. Designed specifically to accommodate supplies and materials of 4 different class students.

Table top surface 45-1/2″ wide by 26″ deep. Each with four numbered lockers 32-7/8″ high by 24″ deep by 4-1/2″ wide; includes special space for drawing board, 26-1/2″ high. Top shelf for instruments. **$75.00**

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- FINE ARTS SCHOOL SUPPLIES
- MECHANICAL DRAWING SUPPLIES AND EQUIPMENT
- MACHINE SHOP TOOLS AND SUPPLIES
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- LOOM WEAVING

Complete Line of School Supplies and Equipment

For your convenience we maintain good delivery schedules on all vocational, art, and educational school supplies. However, due to the increased activities in spring buying, we must receive your orders and inquiries early if we are to continue this prompt service. Remember... our service plus our quality merchandise is a yardstick for discriminating buyers. Brodhead-Garrett has the answer.

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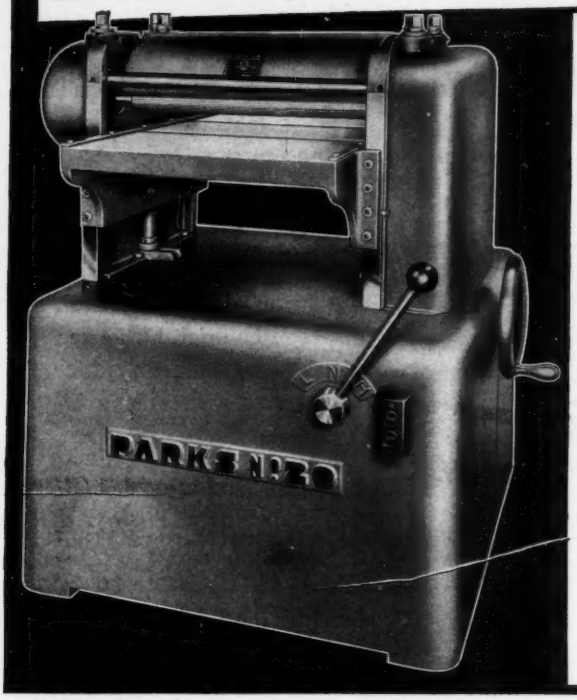

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(Continued from page 10A)

for that project. He gives these slips to the instructor who files them in his locker and the costs are transferred to the ledger, until the end of the school year or semester, at which time the totals and balance for each student is made.

The continuous store's record is kept by the student who is in charge of the tool and supply room.

The inventory form is kept by the instructor and is kept up to date at all times.

The parent notification form is sent to the parent of the student whenever he needs money for projects or whenever he starts a new project, thus making sure that all people concerned are aware of the work of the student.

ASSOCIATION NEWS

(Continued from page 254)

Danville High School, Danville, Ind., and John Eckley of Huntington Twp., Huntington, Ind.

Among the speakers was Dr. Alexander Stoddard, superintendent of schools, Philadelphia, Pa. Dr. Stoddard suggested that much closer relationship should be maintained with industry through "on-the-job" training programs. For a great variety of occupations, this, of course, will involve job analyses worked out, jointly, by supervisors, co-ordinators, and teacher trainers in co-operation with experts in industry in the particular field to be analyzed. Dr. Stoddard's experience in Philadelphia was that all veterans would do excellent work if they were given material directly connected with their job. He indicated that the greatest deterrance to the inauguration of such a program are "in an increasing order" the entrenched subject matter, teachers, the high school principal, and the superintendent himself. Dr. Stoddard advocated a greater use of the school plant for the benefit of industry and the groups interested in education.

At the banquet meeting in the evening, Dr. Stoddard emphasized four points. They are as follows:

1. The need for a radical revision of curriculum along the line of his afternoon's discussion.
2. The need for broader and more wholesome health and recreational programs.
3. The need for attention to mental health.
4. The need for a careful analysis of education as to what democracy really is.

The Indiana Industrial Education Association can follow up this meeting with a professional action committee, which will put into effect all of the ideas that were brought out at the convention.

♦ The first regional conference on printing education will be held at San Jose State College, San Jose, Calif., Saturday, May 22, 1948, at 10:00 a.m.

The special features are:

1. An address by G. Henry Henneberg, manager, Printing Industries of America, Inc., Los Angeles, Calif., on "What the Printing Industry Offers the Youth of Today."
2. A new sound film "Type Speaks," which is the story of the design and manufacture of types from the time of Gutenberg to the present day.
3. A new color movie, "Look to the Years Ahead."

For further information address Hartley E. Jackson, secretary, National Graphic Arts Education Association, San Jose State College, San Jose, Calif.

♦ The Milwaukee branch of the National Stout Alumni Association held its first executive planning session on March 14 at the home of Mrs. Fred Kaufmann, vice-president of the local group. This was the first meeting at which the new officers presided.

The new officers are: president, Howard Schwebke; vice-president, Mrs. Fred Kaufmann; secretary-treasurer, Mrs. Carol Pederson. Joe Tondryk is the new corresponding secretary.

Personal News

♦ Dr. Shriver L. Coover has returned to the campus of State Teachers College, California, Pa., after a leave of three years.

Dr. Coover, director of the industrial-arts curriculum at C.S.T.C., served for the past few years on a commission formed by the Institute of Inter-American Affairs to make a study of the public school system in Chile. He was invited to set up a program of vocational and industrial training in the public schools there.

Soon after Dr. Coover began his work in Chile, he was named chairman of the Commission. At the end of the first year, the Chilean government and their representatives in Washington requested an extension of his leave of absence from California State Teachers College. Dr. Coover performed outstanding service in directing this survey.

♦ Ralph C. Wenrich, assistant superintendent for vocational education, Lansing, Mich., is on leave to serve as an expert on commercial and vocational education on the staff of General Keyes, Commanding General of the United States Armed Forces in Austria, for a period of approximately 90 days. Mr. Wenrich's duties involve

(Continued on next page)

New Interest-Provoker!

Ink Bottle Holder Cap . . . next in the 1948 series of the Eldorado Problem and Solution Service. A problem so provocative it should have the mechanical drawing rooms humming with activity!

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Have your students draw the correct orthographic views with Typhonite Eldorado pencils . . . always dependably uniform . . . unfailingly responsive. The better way to get the best marks is with

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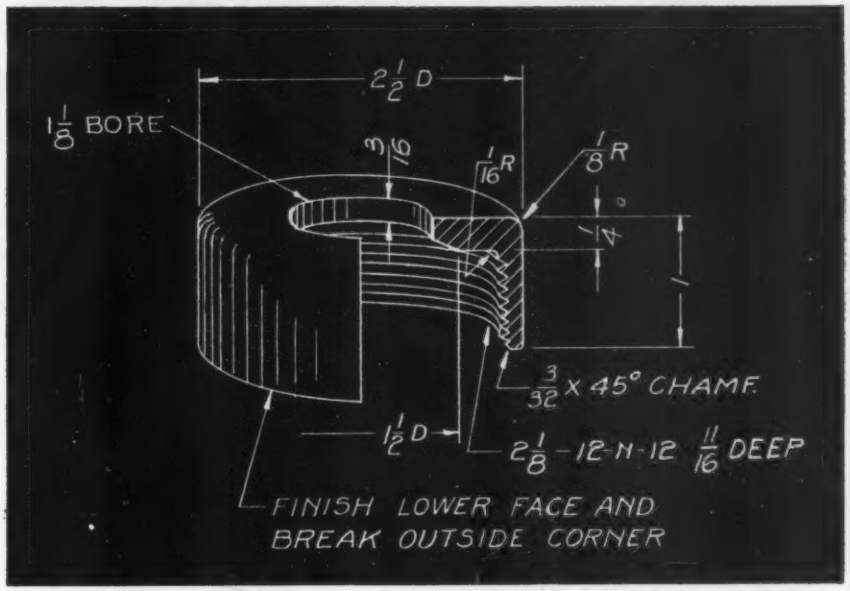

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(Continued from previous page)

lecturing before adult audiences, conferences of educational officials, teachers' groups, and student groups in Austria.

Mr. Wenrich's duties in the State Office during his tour of duty in Austria are being carried on by William B. Hawley, assistant state director of vocational education.

♦ JOHN E. FORTIN, for the past five years assistant director of the Alabama School of Trades, has been appointed director of that school.

He was born in Knapp, Wis., and attended elementary schools there. He completed his high school work in Menomonie, Wis., and attended The Stout Institute where he was graduated with a B.S. degree in vocational education.

After graduation he taught in Wisconsin and Michigan and then accepted a position as assistant state supervisor of trade and industrial education for the state of Georgia. He later became the director of vocational education for the city school system of Augusta, Ga.

He came to the Alabama School of Trades as assistant director in early 1943.

♦ HAROLD W. PORTER has received the degree of Ph.D. in industrial psychology from Purdue University, Lafayette, Ind.

He started his career as instructor of vocational education at the Two Rivers Vocational School, Two Rivers, Wis.

Then he was appointed to the staff of the state board of vocational education at Madison, Wis., and then decided to do graduate work at Fort Collins where he received his master's degree, and then later at Purdue University.

While working on his doctorate he was instructor of the trade and industrial curriculum at Purdue.

♦ GEORGE FARNDALE, plumbing instructor at the Milwaukee Vocational School, Milwaukee, Wis., was elected president of the Wisconsin chapter, American Society of Sanitary Engineering, on April 5, 1948.

♦ VERNE C. FRYKLUND, president of The Stout Institute, Menomonie, Wis., has been appointed by the board of trustees of the college to represent Stout on the special committee for study of higher education in Wisconsin.

♦ ARTHUR OLIVER STORLIE, professor of psychology at the University of South Dakota, died on November 24, 1947, at the age of 43.

He was born at Hampden, N. Dak. After completing high school, he studied at Mayville Teachers College, Valley City College, and the University of North Dakota where he obtained his B.A. degree in education, and in 1943 his master's degree in arts. He taught at Dickey, Rutland, Willow City, Minot, and Ortonville, Minn., and was professor of psychology at Wartburg College, Iowa, and The Stout Institute, Menomonie, Wis., before taking a similar position at the University of South Dakota in September, 1947.

♦ ARMIN F. GIMBEL has recently been employed to teach metalwork in the industrial-education department of the Southwest Missouri State College in Springfield, Mo.

Mr. Gimbel has a B.S. degree from Emporia State Teachers College, Emporia, Kans. He will receive his master's degree from Colorado State College of Education at Greeley, on June 1. He has had a wide range of teaching experience in the field of industrial-arts education, having taught in the public schools of Kansas, Kansas City, Mo., and Joplin, Mo. Mr. Gimbel will begin his teaching at Southwest Missouri State College with the summer term.

♦ DAVID C. BARNES, formerly instructor in the general engineering shops, Purdue University, has taken over Mr. Doty's duties as teacher in the industrial-arts department at Eastern Kentucky State Teachers College, Richmond, Ky.

♦ HOWARD ODIN REED was granted the degree of doctor of education by the University of Illinois, Urbana, Ill., on February 15, 1948.

♦ CHARLES A. DAVIS has organized a new general shop in the Orbisonia High School, Orbisonia, Huntington County, Pa.

♦ VINCENT A. HAWE is teaching in the general shop at McDonald, Washington County, Pa.

♦ ELMER A. LIGHTFOOT, formerly supervising teacher trainer at Williamston, Mich., recently joined the staff of the Agricultural Education Division of the Office of Vocational Education as Supervisor of Veterans' Institutional On-Farm Training.

♦ EARL D. HEATH has accepted a general shop position in the high school at Indian Head, Md.

♦ DAVID JACKSON, JR., is teaching the industrial-arts woodshop in the Scott Township High School at Espy, Columbia County, Pa.

♦ WALTER J. METZGER has accepted a position in the Dayton public schools at Dayton in the state of Washington.

♦ EVERETT R. PASSOJA is teaching electricity in Clearfield, Pa.

♦ THEODORE POCALIKA is doing graduate work at State College, Pa. He will also do some graduate assistant work in the industrial education department.

♦ HENRY M. ROBBINS is teaching general shop at Allison Park, Allegheny County, Pa.

♦ JAMES E. STAHLMAN is teaching industrial-arts work in the Zelienople High School, Butler County, Pa.

♦ JAMES CLINTON PEEBLES, dean of engineering at Illinois Institute of Technology, announced that he will retire at the end of August after an association with Illinois Tech and its predecessor

(Continued on page 14A)

The Only
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BOICE-CRANE No. 2514

Has ¾" arbor, the largest arbor and heaviest bearings of any 10" saw. Handles heavy overloads.

Motor is entirely separate from machine and away from the dust, keeping vibration from the saw arbor and eliminating needless wear on trunnions and slide ways. With motor weight off the arbor, the arbor always stays accurately locked in any tilted position.

28" long cast iron rip fence, precision ground both sides, features one-knob lightning-fast automatic control of both front and rear locks. Fence is aligned as it micro-sets, saving the necessity of raeching over blade to set or adjust fence. Secure and accurate alignment on first lock-up.

Conveniently grouped controls for quickly, accurately tilting, raising and lowering saw blade. Positive locks. Easy-to-read accurate gauges. Large dust chute encloses lower portion of blade, and discharges sawdust away from motor.

Finest miter-gauge yet designed, with patented plunger-setting and adjustable stops for 45° and 90°.

Extra large trunnions for super-accurate saw blade alignment. Approved safety guard hood shields entire saw-blade, tilts with blade. Ribbed steel splitter, prevents work binding. Anti-kikback feature.

Powerful V-belt drive, capable of transmitting up to TWO horsepower. Available in bench or floor models.

SPECIFICATIONS:

Table: 20" x 27"; with extensions 36" x 27".
Saw Blades: 10" dia. max. — Dado Heads 6" dia. x 1-1/16" wide.
Depth of Cut: Saw Vertical: 3". Saw Tilted 2⅛".
Cut-off Capacity: 13" clear before blade.
Bearings: New Departure Grease-sealed.

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- As nearly 100% safe as modern devices permit.
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(Continued from page 13A)

institutions which extends over nearly a half century.

At 67, he is the only individual now connected with Illinois Tech who attended both Lewis Institute and Armour Institute (combined in 1940 to form Illinois Tech) and who is now a member of the academic staff.

His association with Lewis began in 1900 as an undergraduate. After two years, he transferred to Armour, from which he received a degree in electrical engineering in 1904.

After a brief period as a high school teacher in Wabash, Ind., and as instructor at Cornell, from which he received his master's degree in mechanical engineering, he returned to Armour Tech in 1908 as an instructor in experimental engineering. He will complete his fourtieth year in June.

♦ DELBERT L. WHEELER, instructor of industrial arts and co-ordinator at Mt. Vernon, Mo., received his master's degree from the University of Missouri at the close of the 1947 summer session.

♦ LESTER B. KESTERTON, fomerly co-ordinator at Poplar Bluff, Mo., is now a research assistant and graduate student in industrial education at the University of Missouri.

♦ CLAUDE A. BELL, of Monroe, N. C., is now a part-time instructor in the Engineering College of the University of Missouri, where he is also doing graduate work in industrial education.

♦ GRAYSON H. HILL, after completing the work for his master's degree at the University of Missouri, has been made principal and co-ordinator at the high school at Elberton, Ga.

♦ CHARLES R. HILL, a graduate of The Stout Institute and formerly of Iowa State College, is now a research assistant and graduate student in industrial education at the University of Missouri, Columbia, Mo.

♦ V. R. FAULDS, of Clearwater, Fla., is now enrolled in the University of Missouri, and is doing graduate work in the field of industrial education. He served in the army during the recent war.

♦ ELMER C. MINNICK has returned to his job as co-ordinator at Richmond, Mo. After being released from the navy where he served as an officer, he completed his work for the master's degree at the University of Missouri, Columbia, Mo.

♦ BERRY E. MORTON, last year a member of the staff of the State Teachers College at Oswego, N. Y., is currently a part-time instructor in the Engineering College and a graduate student at the University of Missouri. During the summer session he will serve as an instructor of industrial education.

♦ DONALD F. HACKETT joined the industrial-education staff of the Murray State Teachers College at Murray, Ky., after completing his work for the master's degree at the University of Missouri. Besides his teaching assignment, he is serving as superintendent of buildings and grounds for the college.

♦ EDWARD BRIDGE is setting up a new industrial arts and vocational shop for the parochial school at St. Mary's in Elk County, Pa.

♦ JOHN W. MONDROSCH is teaching industrial arts in the Plaquemine High School, Plaquemine, La.

♦ MERRILL CAMPBELL, who taught in the Midland, Pa., High School for eight years before entering the U. S. Army, is now teaching in the Barton High School, Barton, Allegheny County, Pa.

♦ ARNOLD KLINE, postgraduate, 1947, is organizing a new industrial-arts department in the high school at Summerville, Jefferson County, Pa.

♦ LEMOYNE POLLOCK, who spent some time with the Veterans Administration upon his return from service in the U. S. Army, is now teaching industrial arts in the high school at Frederick, Md.

♦ WILLIAM EISTER is teaching art metal and plastics in the Binford Junior High School, Richmond, Va.

♦ JAMES DANIERO is teaching drawing in the Bainbridge Junior High School, Richmond, Va.

♦ DICKEY BROESEKER is teaching industrial arts in the high school at Meyersdale, Somerset County, Pa.

♦ WILLIAM B. LOGAN, Greensboro, N. C., has been appointed instructor and teacher trainer in distributive occupation on the staff of the department of education at Ohio State University. He will take over his new duties during the summer.

Mr. Logan will organize and direct a teacher-training program for teachers of salesmanship, merchandising, and other retail-training subjects in secondary schools and colleges of Ohio.

He received his A.B. at Furman University in Greenville, S. C., and his M.S. at the University of North Carolina in 1943. At present he is teacher trainer for the distributive education service in the department of business education of the University of North Carolina.

♦ C. E. WELSH has been promoted to assistant director of personnel in the Pittsburgh Public Schools. He was instructor of the South Hills woodshop, Pittsburgh, Pa., before the promotion.

♦ DR. T. KEITH GLENNAN was inaugurated as fourth president of Case Institute of Technology, Cleveland, Ohio, May 20 and 21.

♦ DABNEY B. DOTY is on leave from the industrial-arts department, Eastern Kentucky State Teachers College, Richmond, Ky., in order to do graduate work at the University of Missouri.

♦ JOE C. HURST of Brunswick, Ga., completed the work for his master's degree in industrial education at the University of Missouri at the close of the 1947 summer session and is now instructor of industrial arts at Hinseville, Ga., where he has just established a new department.

♦ MARION E. MADDOX of Fulton, Mo., received his master's degree in industrial education from the University of Missouri in the spring of 1947 and is continuing work toward his doctor's degree in that institution.

(Continued on next page)

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♦ EARL A. MORGAN, of Carbondale, Ill., is now enrolled in the graduate school of the University of Missouri, where he is majoring in industrial education. Mr. Morgan is also teaching part time in the Engineering College.

♦ DONALD J. AMELON, a graduate of the University of Missouri, has been elected teacher of industrial arts at Fitzgerald, Ga.

♦ JAMES H. DAVIS, on leave from the State Teachers College at Johnson City, Tenn., is now employed part time in the Engineering College at the University of Missouri and doing graduate work in industrial education at that institution.

♦ ARTHUR C. SHOCKLEY of Springfield, Mo., completed his work for the master's degree in industrial education at the University of Missouri during the 1947 summer session and has returned to Springfield as instructor of industrial arts.

♦ ROBERT C. WALDRON, of Murphysboro, Ill., received his master's degree in industrial education at the University of Missouri at the close of the 1947 summer session and is now instructor of industrial arts in the Murphysboro High School.

♦ J. I. WOLFE of Kansas City, Kans., received his master's degree in industrial education at the University of Missouri at the close of the 1947 summer session and returned to his position as instructor of industrial arts at the Wyandotte High School in that city.

♦ FRANK VUKOVICH is teaching industrial arts in the high school at Johnsonburg, Elk County, Pa.

♦ ANDREW J. ONDREI is teaching woodworking and drafting in the East Brady High School, East Brady, Clarion County, Pa.

♦ VINCENT C. PUGLISI is installing equipment and reorganizing the industrial-arts program in the high school at Hastings, Cambria County, Pa.

♦ JAMES DICKSON has moved from the industrial-arts department of Baldwin Twp. High School to the Pittsburgh School System, Pittsburgh, Pa. He is teaching graphic arts and drawing at Arsenal Junior High School.

♦ VINCENT J. CONNELLY has moved from the Hampton Twp. High School to a position in the Uniontown, Pa., Schools.

News Notes

♦ Dean Thorndike Saville of New York University's College of Engineering recommends a general four-year course for all engineering students. The first three years would have all of the basic sciences and fundamental engineering subjects now offered, together with courses in history, public affairs, and economics, not now found in engineering courses. The fourth year would have a considerable number of electives, designed on the one hand for those who expect to terminate their technological engineering education in four years, and on the other hand for those who by desire, aptitude, and ability, planned or were selected to take a fifth year of specialized programs leading to the designated bachelor's degrees such as A.E., C.E., M.E., and E.E.

♦ Selectron resins, the highly versatile plastics developed by the Pittsburgh Plate Glass Co., 632 Duquesne Way, Pittsburgh, Pa., research laboratories for top-secret wartime radar and aircraft applications, have been converted for an almost limitless field of postwar applications.

Each of the Selectron series of resins has been designed to meet a specific application or type of application in industry. Variations of viscosity, adhesive quality, and curing conditions are all taken into consideration. Within limits, resins are made according to specifications available which will meet the customer's needs.

The Selectron series of resins are now applied to laminating, impregnating, casting, molding, as adhesives, and as stain-resisting decorative material for walls and table tops. It also is used for preserving specimens of all varieties including sections of the human body for use in anatomy schools and laboratories and for coating cinder brick to produce a durable, highly decorative building material.

The range of the Selectron series differs in strength, hardness, flexibility, resistance to heat, electrical properties, abrasion resistance, water absorption, and other properties from which the essential physical requirements of any plastics application may be met.

♦ "Joint management-labor apprenticeship programs are proving powerful factors in building good industrial relations." This statement was made by William F. Patterson, director, Bureau of Apprenticeship, U. S. Department of Labor, in Minneapolis, at ceremonies at which certificates of completion were awarded to Minneapolis and St. Paul mechanics in the construction industry who recently completed their terms of apprenticeship. The affair was held under the auspices of the Twin City Building Trades Joint Apprenticeship Committees. These committees are the employer-union bodies which administer the building trades apprenticeship programs in the two cities.

"Industrial relations have been improved in every case in which management and labor participate jointly in an apprenticeship program, as such programs represent voluntary action on the part of employers and their employees to work together for their mutual benefit," Patterson said.

"It is one of the principal functions of the Bureau of Apprenticeship, through its field representatives throughout the country to get

(Continued on next page)

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"Zero Precision" taper roller spindle bearings are only one of the important "school features" of the SHELDON TU-S56 school lathe. Others include:

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Safety	Fully enclosed headstock and drive. (All speed changes are made by outside levers.)
Capacity	11¼" Swing, 1" Collet Capacity, 56" Bed.
Practicality	Standard big lathe design, controls and features.
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Moderate Price	Built in a modern specially tooled plant with the finest most modern equipment this quality lathe can be sold at a moderate price.

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Prepared in co-operation with leading vocational training experts, written in simple shop language, it provides the information students need about tools, machines and modern metal working methods. 200 illustrations, 30 reference tables. Available through STARRETT tool dealers — one dollar per copy.

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(Continued from previous page)

management and labor together to establish and maintain joint apprenticeship programs.

♦ Dr. Deyo B. Fox, director of the Division of Vocational Education, announced Western Michigan College's plans for its first Distributive Education Workshop on the campus during the 1948 summer session. Teacher training in distributive education is one of the more recent services being rendered the state by this division of the college.

Adrian Trimpe, from the Vocational Division, and teacher trainer for the state, will supervise and direct the workshop. An excellent staff of especially well-qualified individuals has been secured to take part in the program. They are: G. Henry Richert, program planning specialist, Business Education Service, U. S. Office of Education; Jennie Scott Graham, Department of Retailing, the University of Buffalo; Fred Anderson, display consultant, division of field services, Central Michigan College of Education; and Dr. Deyo B. Fox.

An additional group of consultants also available for those participating in the workshop will be: Jack Milligan, chief, and Lawrence T. Thomson, supervisor, Business Education Division, Michigan State Board of Control for Vocational Education; and Willard M. Bateson, director, Instructional Materials Laboratory, University of Michigan.

For additional information write to Adrian Trimpe, associate professor of distributive education, Western Michigan College of Education, Kalamazoo 45, Mich.

♦ The McGraw-Hill Book Co., Inc., 330 West 42nd St., New York 18, N. Y., has published a book entitled *Junior College Terminal Education in Your Community*. It was prepared by independent junior-college authorities, and the McGraw-Hill Book Co. hopes that it may be of some value to states and local communities in the planning and operation of their own community junior colleges.

The booklet outlines what junior college education aims to do, presents directions for making an occupational survey, explains the organization of the various needed community committees, and gives directions on how to select the junior college faculty.

A comprehensive list of selected readings is appended.

♦ The tenth National Institute for Traffic Training will be conducted July 5 to 23 at Northwestern University, Evanston, Ill., by the National Committee for Traffic Training, composed of leading organizations in the traffic safety field.

There are six courses for police, driver training instructors, etc.,

For further information address Northwestern University.

♦ A list of college offerings in guidance and personnel work during the summer of 1948, along with a listing of summer workshops and conferences in these fields, is available in a regular annual directory just published by the Office of Education, Federal Security Agency, Office of Education, Washington 25, D. C.

♦ The following "Occupational Briefs" are available at 15 cents each, from Science Research Associates, 228 So. Wabash Ave., Chicago 4, Ill.

No. 207, Industrial Glass Industry Workers; 208, Upholsterers; 209, Court Reporters; 210, Safety Engineers; 211, Metallurgical Engineers; 218, Travel Bureau Workers; 219, Hat Manufacturing Workers; 220, Professional Football Players; 221, Ophthalmologists; 222, Theater Management Workers; 223, Mail Order Workers; 230, Record and Radio Shop Workers; 231, Magnesium Industry Workers; 232, Film Industry Workers.

♦ The All-American Soap Box Derby, growing annually in size, importance, and nation-wide participation, will be bigger and better than ever in 1948.

The Derby will be run this year in 150 communities of the United States, Alaska, Canada, and the Panama Canal Zone. Each of the towns or cities participating will send a champion to Akron, Ohio, to compete in the colorful spectacle of the national and international finals August 15.

It is estimated that between 30,000 and 50,000 boys between the ages of 11 and 15 will participate in the local races.

To enter the local, newspaper-sponsored Soap Box Derby, a boy must apply to his local Chevrolet dealer with at least one of his parents. There he signs registration forms, receives a copy of the rule book and other forms, and is ready to begin the building of his racing car.

♦ A fully equipped German Diesel engine research laboratory valued at more than one million dollars, will shortly be transplanted to the campus of Oklahoma Agricultural and Mechanical College in Stillwater, Okla.

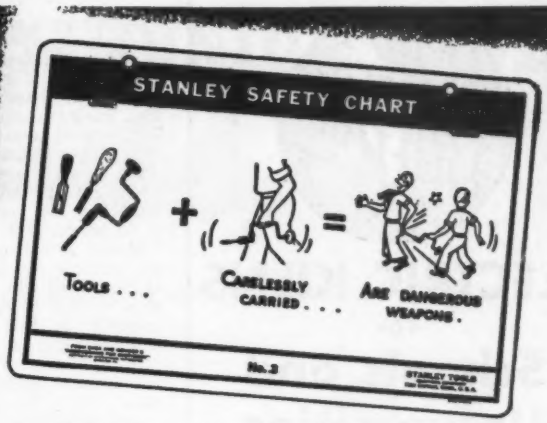
Location of the former Klockner-Humboldt-Deutz laboratory at Stillwater will provide that institution with one of the two largest Diesel engine research centers in the United States. With allocation of the laboratory, President Harry G. Bennett of Oklahoma A. and M. announced establishment of the Oklahoma Institute of Technology, replacing the Division of Engineering of the College.

The laboratory, formerly located at Oberursel, Germany, was assigned to this country by the Joint Chiefs of Staff shortly after VE-Day. Donation to Oklahoma A. and M. was made possible under a joint allocation of the Office of Technical Services, Department of Commerce, and the Office of Education, Federal Security Agency.

♦ The National Safety Council, 20 North

(Continued on next page)

NEW! STANLEY SAFETY CHARTS



A Series of 36 Pictorial Wall Charts to Promote Safety in the Use of Tools and Machines in School Shop

It is important that your students – the skilled tool users of tomorrow – be trained in ways of safety as they learn the use of tools and machinery. These charts put this idea across with simple, graphic emphasis. To promote safety in schools, as well as in future work, Stanley offers this series of charts at cost of printing and postage. No finer investment could be made in school shop training. ORDER A SET TODAY!

In each set, there are 18 cards, printed in colors on two sides – 36 charts in all. Charts are mounted on heavy cardboard, lacquered for easy cleaning, and have metal grommets for hanging.

$2.50 postpaid in the U.S.A. In Canada*, $4.10 a set postpaid.

STANLEY TOOLS, NEW BRITAIN, CONNECTICUT

THE TOOL BOX OF THE WORLD

STANLEY

Reg. U. S. Pat. Off.

HARDWARE · HAND TOOLS · ELECTRIC TOOLS

Stanley Tools, Educational Dept., IA-648, New Britain, Conn.

Enclosed is $2.50. Please send postpaid the complete set of STANLEY SAFETY CHARTS. (*In Canada $4.10 postpaid. Check or Money Order payable in Canadian Funds must accompany order. Shipment to be made from Stanley Tool Co. of Canada, Ltd., Roxton Pond, Quebec.)

Name.....

School Name.....

Address.....

City.....*State*.....

(Continued from previous page)

Wacker Drive, Chicago 6, Ill., has just issued a new manual entitled "Foundation for Safe Living." It is especially designed for elementary school teachers and principals.

For this reason the manual was prepared by elementary school teachers and principals, and it was planned to accompany, and be used with, "Much to do About Safety." Either manual, however, may be used independently.

Elementary schools have done a good job of helping to save elementary school children from accidents. But even more important is the job of teaching these children how to meet the hazards they will encounter after they leave the elementary schools. This manual will help to teach the children to protect themselves, and others, in later life.

♦ Representatives of the Wisconsin Master Plumbers' Association, State Board of Health, Industrial Commission and State Board of Vocational and Adult Education, recommended that, henceforth, plumbing apprentices will be required to have high school diplomas or an equivalent education.

The conference on apprenticeship preceded the annual convention of the Wisconsin Master Plumbers Association, which was held on April 5, 1948.

♦ The Second National Smithing Workshop Conference for Teachers, to be held August 2 to 27, 1948, has been announced by Handy and Harmon, 82 Fulton St., New York 7, N. Y. Write to this firm for information.

♦ The Waukegan Township Secondary Schools, Department of Trade and Industrial Training, Waukegan, Ill., have issued a brochure entitled "Your Future" which describes the department's courses in a very interesting manner.

Orlin D. Trapp, the director of the school's trade and industrial department, would like to exchange with other schools that have produced similar types of publicity for their trade and industrial education department.

♦ The Modern Talking Picture Service, 9 Rockefeller Plaza, New York 20, N. Y., has recently released an edition of "Index and Guide" to free educational sound films from industry. These films are of interest to nearly every department of a school.

♦ A superior film cement, for splicing all types of 8mm., 16mm., and 35mm. motion picture film, is announced by the Bell & Howell Co., Chicago, manufacturers of precision motion picture equipment.

Tests have shown the new cement to possess the combined virtues of great bonding strength and splicing speed, both highly necessary for professional use. Tests show further, it is claimed, that there is no distortion of film at the splice, and a minimum tendency for the cement to flow over the film or between the film and the splicer blades.

The new cement will be available in one-ounce, half-pint, pint, and quart bottles.

For further information write to Bell & Howell Company, 7100 McCormick Road, Chicago 45, Ill.

♦ Coronet Instructional Films, Coronet Bldg., Chicago 1, Ill., has just published a new catalog of 16mm. sound motion pictures produced for use in schools and training institutions.

The films cover the language arts, basic study skills, guidance, business, social science, general science, physical science, natural science, health and safety, and physical education.

♦ The Arts Co-operative Service, 519 West 121st St., New York 27, N. Y., has issued a publications catalog of pamphlets which are specially adapted to the needs of the elementary school. The pamphlets cover crafts and related activities; photography; plays, puppets, and musical instruments; maps and globes; food studies; how man learned to count and measure; activities for children from 3 to 7 years; American colonial and pioneer life; American Indian life; Latin American life; Oriental life; African life and the life of Ancient Egypt; ancient Greek, Roman, and Hebrew life; Medieval European life; Communication; and aviation.

♦ National Standards of Apprenticeship for Tile Setters. Paper 16 pp., 5 by 7 in. Sent gratis to interested parties. Apprentice-Training Service, U. S. Department of Labor, Washington 25, D. C.

♦ A booklet entitled "Analysis of Workmen's Compensation and Discussion of Coverages," has just been issued by the Insurance Department of the Chamber of Commerce of the United States, Washington, D. C. The booklet is of great value to anyone required to pay out cash for premiums on such policies.

Attention is called to the fact that many employers are in doubt as to the type of reports required of them. Provisions for appeal of decision, who must be covered in the policies and the exceptions set out, the waiting periods, the medical and surgical benefits for which employers are liable, the penalties that occur in the event minors are employed, are just some of the day-to-day questions discussed.

♦ The vocational machine-shop boys in Crown Point, Ind., have organized a machinist club and have set about raising money for incidental equipment for the machine shop. Approximately $450.00 has been spent to date for specialized hand tools and small power tools. Mr. Chester Hale is sponsor for the group.

♦ The Penland School of Handicrafts, Penland, N. C., grown from its original establishment as mission to train mountain craftsmen into a widely known crafts center, will have the most active program of its history this summer, it is announced by Miss Lucy Morgan, director of the school.

The main summer sessions, which annually attract students from all over America, as well as from foreign countries, will begin June 7,

(Continued on next page)

Harper

ELECTRIC KILNS
for
Schools and Universities

The photograph below shows one of many Harper installations giving satisfactory performance for vocational training in educational work. This Harper Electric Kiln has been in continuous use since 1940 in the Memorial Art Gallery at Rochester, New York.

Experience gained in classrooms equipped with Harper Electric Kilns has the added advantage of students' training on the same equipment used in industry, commercial potteries and studios. Instructors are provided with sturdy, dependable classroom and laboratory equipment which can be operated with confidence from term to term. Pure radiant heat produces true colors and sparkling glazes . . . close temperature control guarantees repetition of successful firing schedules. Complete range of sizes. Write for data.

Harper
ELECTRIC FURNACE CORPORATION
1445 Buffalo Avenue
NIAGARA FALLS, N. Y.
Representatives in principal cities

(Continued from previous page)

with four terms of 3 weeks each. Instruction will be in charge of Rupert Peters, formerly director of visual education at Kansas City.

The school is located on top of a mountain in Mitchell County, near Spruce Pine, in the mica mining section of the Blue Ridges. Near by are many vacation attractions, including the Blue Ridge Parkway, and several small resort communities.

♦ The Kindt-Collins Company, originator of latex-type disk cement, announces the return of its Master Disk Cement to prewar standards.

Master Disk Cement is easily applied to both the abrasive and the metal disk with a bristle brush. When the cement changes color, the abrasive disk is placed in position and rolled smoothly so that complete contact is made. The brush can be cleaned with water.

A special type of Master Disk Cement is available for cementing the heavier types of abrasive disks.

Full information about this cement may be secured from The Kindt-Collins Company, 12653 Elmwood Ave., Cleveland, Ohio.

♦ Educational material on the use of the lithographic (offset) process has been made available to printing instructors in advertising courses for the spring term by the Lithographers National Association, Inc., 420 Lexington Ave., New York, N. Y.

This educational material fills a gap in graphic arts education for the planners and buyers of printing and was first prepared and made available by the Association in 1946.

♦ A 24-page booklet giving complete descriptions of Westinghouse sound motion pictures and slide films available for industrial and civic use, has been released by the Westinghouse Electric Corporation.

Four colored and 12 black and white sound movies, plus 8 black and white slide films are loaned free except for cost of transportation. Subjects covered include: electronics, electricity, radio, RF heating, research, industrial maintenance, safety, vitamins, and nutrition.

Also offered are four slide-film instruction courses, broken down into separate lessons, that deal with resistance welding control, electrical measuring instruments, electronics, and RF heating.

Copies of the booklet (B-3988) may be obtained from the Film Section, Westinghouse Electric Corporation, P. O. Box 868, Pittsburgh 30, Pa.

♦ The general metal shop under the direction of George Price, of the Jefferson High School, Lafayette, Ind., has completed a very valuable photographic drier. Mr. Price is a critic teacher for Purdue University.

New Publications

A Manual on Pottery Craft

By J. A. F. Divine and G. Blachford. Cloth, 85 pp., 5⅝ by 8¾ in., illus. The Manual Arts Press, Peoria 3, Ill.

This interesting book on pottery craft, designed for students and hobbyists, was announced on page 20A of the April issue. Unfortunately, we did not state in that review, that The Manual Arts Press are the American outlet for this book.

Essentials of Radio

By Morris Slurzberg and William Osterheld. Cloth, 806 pp., 6⅜ by 9¼ in., illus., $4. McGraw-Hill Book Co., New York City.

A very comprehensive book on the radio for those taking up the subject in high school, technical school, vocational school, or junior college. No involved mathematical knowledge is required of the learner.

The 15 chapters explain the development of the vacuum tube, radio circuits and other applications of electronics; circuit analysis; receiving circuits; detector circuits; tuning circuits; radio frequency amplifier circuits; audio-frequency voltage amplifier circuits; power amplifier circuits; vacuum-tube oscillator circuits; power-supply circuits; audio units; transmitting circuits; receiving circuits; and testing equipment.

The book contains numerous problems and each chapter presents an extensive list of questions for discussion. There also is an appendix which contains useful tables, formulas, abbreviations used in radio literature, and symbols found on electronic diagrams.

Counseling Employees

By Earl M. Bowler and Frances Trigg Dawson. Cloth, 247 pp., 5⅝ by 8¼ in., $4. Prentice-Hall, Inc., 70 Fifth Ave., New York 11, N. Y.

A book which shows that proper counseling definitely improves industrial relations. It also gives directions on how this counseling should be done.

The four chapters into which the book is divided, treat the subject under the following titles: Why Counsel Employees?, Special Phases of Counseling, The Counselor's Job, and The Counseling Program.

Machine Woodworking

By Robert E. Smith. Cloth, 152 pp., 8 by 10½ in., illus., $2.75. McKnight & McKnight, Publishers, Bloomington, Ill.

A text for use in an advanced woodworking class. It deals, as it rightly should, with safety first. Then follow a number of factors which are important if the beginner is to learn orderly procedure in keeping a shop in good order.

The following chapters then explain how to operate the lathe, use power and hand grinders, do work on the circular saw, use band and jig saws, jointers, planers, mortisers, shapers and routers, and power sanders.

Projects in Woodwork

By J. H. Douglass and R. H. Roberts. Cloth, 135 pp., 7⅞ by 10½ in., illus., $3.50. McKnight & McKnight, Bloomington, Ill.

A book of excellent suggestions for anyone who wants to build a birdhouse, games of various kinds, wastebaskets, door stops, tie and shoe racks, wall shelves, chests, trays, children's furniture, cupboards, book ends, footstools, lawn chairs, trellises, lawn table, magazine holders, end tables and book racks, bookcases, record cabinets, refreshment, occasional, and coffee tables, bedside stands, kneehole desk, vanity benches, candle sticks, and electric wall brackets, table lamps, kitchen stool, foot stools, telephone stand and seat, dinette table, dinette chairs, sewing cabinet, fernery, butterfly table, vanity dresser, and modern beds.

An Approach to Radio

By. J. B. Shrewsbury. Cloth, 288 pp., 6¼ by 9 in., illus., $4.50. Electronic Industries, Princeton, Ky.

An introductory text which is intended to give the beginner an interesting entry into the study of the principles which underlie the subject of radio. The language used in this book is simple and direct, and the illustrations are well drawn line cuts.

The contents is divided into eight chapters in which are discussed radio transmission and reception, the audio oscillator, the beat note receiver, the audio amplifier, receivers, and transmitters.

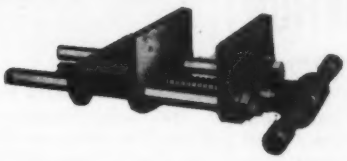
Pencil Pictures

By Theodore Kautzky. Cloth, 86 pp., 9⅛ by 12¼ in., illus., $5. Reinhold Publishing Corp., New York, N. Y.

The author presents clearly just how an artist goes about planning the picture which he wants to draw, how he analyzes his problem, and how he decides what is essential and what he can leave off in order to portray most clearly what he wants to convey to those who study his picture.

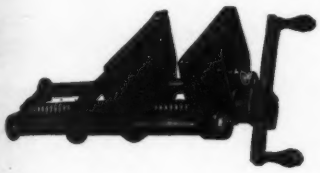
(Continued on page 27A)

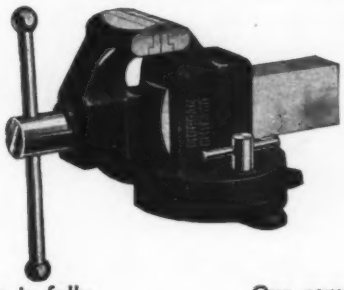
the new MORGAN JUNIOR VISE

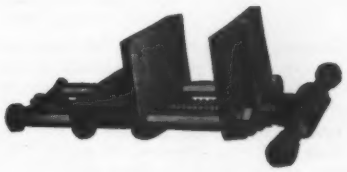


Here is a new low cost woodworking vise — ideal for school-shop use. Made of best materials, light in weight, yet sturdy in construction. This vise will stand years of hard service.

—and how school people want them





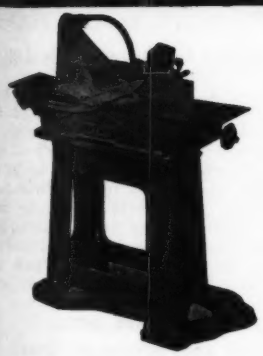


The famous Morgan line of vises is fully guaranteed. Thirty years of experience in manufacturing vises is your assurance of a vise that will give the utmost in service for many years.

Our complete line of vises include woodworking machinists, combination pipe sheet metal vises. Write for complete details and prices.

MORGAN VISE CO. 108-112 N. JEFFERSON ST., **CHICAGO, U.S.A.**

WALLACE
"MACHINE-OF-THE-MONTH"



No. 10 JOINTER

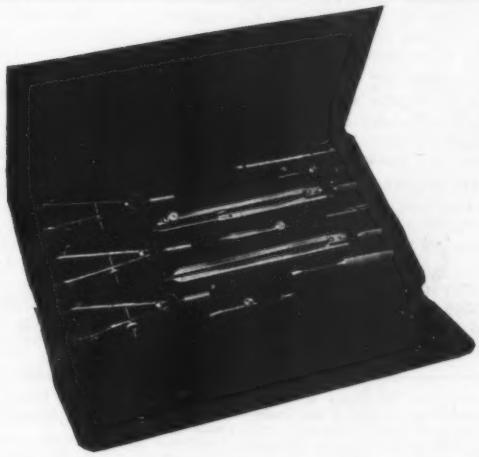
Direct drive at 3600 or gear drive at 5200 r.p.m.! 8" *four*-knived cutter-head with knives set askew for *shearing* cut! Taper roller bearings. Semi-steel tables. Capacity to cut ¾" deep.

What a Jointer! This quality-built Wallace No. 10 Model has power — speed — capacity and accuracy in a measure never known before!

Skew-set knives take a shearing cut — does *perfect* edging work, rabetting, bevelling. Smooth, clean surfacing cuts seldom require sanding.

Write today for bulletins, — we also manufacture high-grade Universal Saws, Radial-arm Saws, Bandsaws, Shapers, Lathes, Mortisers, Oilstone Grinders, etc.

J. D. WALLACE & COMPANY
140 S. CALIFORNIA AVE. CHICAGO, ILL.



No. 700 Drawing Set Price per set, $15.00
SPECIAL SCHOOL DISCOUNT

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Send for complete catalogue, Slide Rules, Triangles and Instruments.
93 W. PALISADE AVE. ENGLEWOOD, N. J.

TRADE TECHNOLOGY
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RELATED INFORMATION

Practical — Authoratative
Job-Tested

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2 MASONRY SIMPLIFIED, Vol. II — Practical Construction. The practical methods of constructing each detail of a structure. Completely illustrated. Price $5.00

3 FUNDAMENTALS OF CARPENTRY, Vol. I — Tools, Materials, Practice. Durbahn. This newcomer to our popular building trades series presents the fundamentals in "teachable" form for the beginner and the apprentice. The organization is flexible, making it easily adaptable to a wide variety of training programs. Price $3.25

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6 DICTIONARY OF CARPENTRY TERMS. Durbahn-Dalzell. The terms of the carpentry trade and related fields concisely defined in the language of the trade. Price 75¢

7 TOOL AND DIE DESIGN — STUDY GUIDE. A new addition to our popular series of Study Guides. Includes assignments in standard texts, study questions, self-check questions, and comprehensive examinations. Price $1.50

8 TRANSFORMERS. Dunlap-Siefert-Austin. The authors, who are all authorities in this field, have presented a thorough treatment of the subject as applied to the problems of the practical man. Price $2.75

9 DIRECT CURRENT MOTORS AND GENERATORS. McDougal-Keith-Ranson. The fundamental and advanced principles presented in understandable terms. Price $3.00

Please send me the books circled below on 30 days examination. If any of the books are adopted and 12 or more copies ordered, I will retain the adopted books as desk copies; otherwise, I will return them or remit less the educational discount.

1 2 3 4 5 6 7 8 9

Name.....

School.....

School Address.....

AMERICAN TECHNICAL SOCIETY

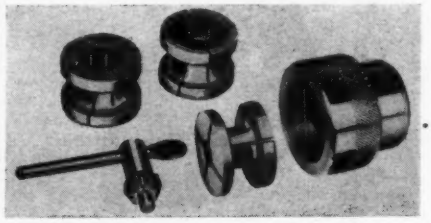
Drexel at 58th Street Chicago 37, Ill.

DEPT. W323

Shop Equipment News
NEW PRODUCTS — PUBLICATIONS

MARTIN COLLET CHUCK

The Martin Collet Chuck is a steel precision tool. The collets are slotted at both ends allowing equal collapse and gripping power throughout their length. The viselike grip of the collets, without longitudinal play or movement, enables accurate alignment of tools with the work.



New Martin collet chuck

The Martin collet chuck will be found useful for pattern shops, toolrooms, school and home workshops. This chuck has been designed for extremely safe operation. There are no projections to catch or injure tools or fingers. Turning may progress right up to the very collets without the least sacrifice of safety. Both experienced and inexperienced operators may use this chuck without danger.

The Martin collet chuck will not mar your work, as they provide an even, form fitting, vise-like grip with a simple twist of the chuck sleeve.

The chucks are available in two spindle sizes: No. 201 — 1-in. arbor hole, 8 threads per inch; No. 202 — 1½-in. arbor hole, 8 threads per inch. Additional sizes, within the limits of the stock, will be supplied at an additional cost of 10 per cent.

The chuck with its three double-end collets, can accommodate seven sizes of round stock. By utilizing the full 2-in. capacity of the chuck without collets, 2-in. work can be chucked. The smallest collet will take ½ and ⅝-in. stock; the second size will take ¾ and 1-in. stock; and the third collet will take 1¼ and 1½-in. stock.

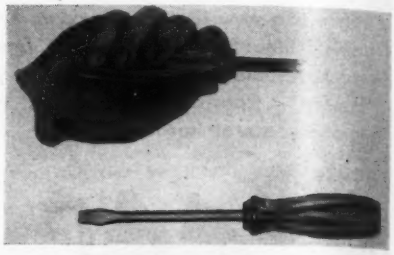
The chucks are supplied with three, double-end collets. They are obtainable in steel, and also made of a less expensive alloy, the latter being made for home workshop use.

For brief reference use IAVE—0601.

HAND-FITTING SCREW-DRIVER HANDLES

The Plomb Tool Co., Los Angeles 54, Calif., is marketing screw drivers with handles that are reshaped to fit the hand better. These plastic handles are the result of a two-year research program — conducted to improve the appearance, feel, and utility of screw drivers. During the project, many mechanics contributed ideas and tested trial designs.

The hand-fitting handles are rounded and larger through the palm section and smaller in diameter at the end where the little finger grips. Lengthwise ridges, or flutes, prevent hand slippage. A square section near the bottom has depressions to allow a positive grip by the thumb and forefinger, which provide 50 to 55 per cent of the total turning power of the hand. A high shoulder at the bottom permits a harder push with less squeezing effort and less danger of hand slipping. This shoulder is round, so it can be spun with the fingers. The handle end is crowned to fit the palm when used for hard pushing.



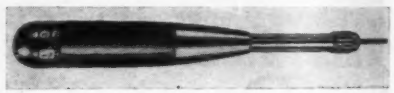
Hand-fitting screw-driver handles

The plastic selected is nonflammable and non-explosive, and is a good insulator. It possesses toughness and impact strength, even at low temperatures. To anchor the handles securely, they are molded right on the shanks instead of being driven into place.

For brief reference use IAVE—0602.

NEW MILLERS FALLS AUTOMATIC DRILL

The automatic drill illustrated herewith has just been announced by the Millers Falls Co., Greenfield, Mass. The No. 100 automatic drill is quite attractive. Its barrel is made of tough, gleaming red Eastman's Tenite No. 2 plastic, and all exposed metal parts are highly buffed and polished. Molded in the handle are 8 drill-point compartments; the barrel top carries a ring which shows the number and diameter of the drill point to be found in each. Drill points 1/16 to 11/64-in. diameter are supplied as regular equipment.



New Millers Falls automatic drill

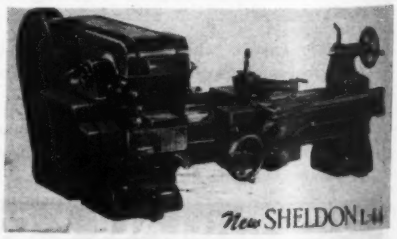
The drill is 9⅛ in. long, weighs only 8 oz., and drills rapidly and easily in hard or soft-woods, wallboard, plaster board, soft metals, and similar materials. The multiple toothed spiral and center nut work smoothly, and an internal spring operates the handle return. Drill points are held securely by four steel jaws in the shank.

Carpenters, cabinetmakers, model makers, home workshop enthusiasts, homeowners, and craftsmen generally will welcome this compact "push drill" as a handy addition to their toolbox or workbench.

For brief reference use IAVE—0603.

SHELDON ADDS NEW 10-IN. LATHE

Sheldon Machine Co., Chicago, Ill., manufacturers of Sheldon precision lathes and Sheldon



New 10-in. Sheldon lathe

(Continued on page 22A)

PLAN NOW

. . . to use *Easy-Handling*

SKIL Sanders

on your Fall Training Program

The vast majority of vocational instructors prefer to train students with SKIL Sanders . . . because they're lightweight, better balanced, produce a finer finish faster. This is a powerful stimulus for young workers . . . it encourages them to do even better work with these tools that are first choice among professional woodworkers. SKIL Sanders are available in 4 models, from 2¼" to 4½" belts, one with vacuum dust collector. Call your SKIL Tool Distributor today for a demonstration and get set for your Fall program.

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5033 Elston Avenue, Chicago 30, Illinois
Factory Branches in Principal Cities
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SKIL ELECTRIC Tools PNEUMATIC
TRADE-MARK

Which of these new drills catches *your* eye?

Which of these slick new drills would you like your students to have at their workbenches? Which would give them *new* interest in their work? *Both* have that clean, solid *look* of a good tool that any student craftsman recognizes. Hard to choose between them? Why deny your pupils either one, when you can buy a stock of both for so little! They're the finest looking drills we've ever made, released now to celebrate Millers Falls' 80th Anniversary. Ask your supplier *now*.

MILLERS FALLS
¼" Hand Drill
#104 $5.00

Slightly higher in the west. Complete with 8 drill points.

Machine-cut gears; "Oilite" spindle bearing with ball thrust; true-running 1/4" chuck with 3 hardened jaws. Easy-grip plastic handle holds 8 standard points (1/16" to 11/64").

MILLERS FALLS
Automatic Drill
#100 $3.50

Slightly higher in the west. Complete with 8 drill points.

Exposed metal parts nickel plated steel and buffed aluminum. Right-tension spring gives quick handle return. Eight drill points (1/16" to 11/64") in rugged plastic handle. Dial the drill you want, and tip it out.

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Celebrating 80 Years of Toolmaking

LUFKIN MICROMETER
No. 1911

Extra sturdy. Hardened ground thread. One-piece spindle. Each thousandth numbered for rapid, easy reading. Give your students the advantages of industry's finest tools—specify Lufkin in your requisitions. Write for free catalog.

LUFKIN THE LUFKIN RULE CO.
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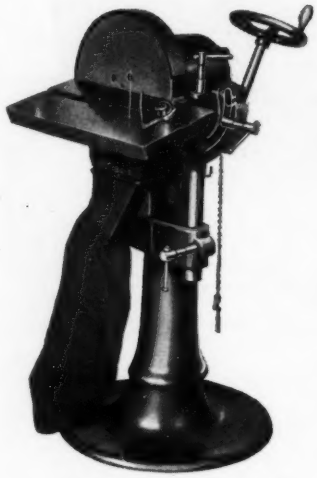
New York City

"OLIVER" 15-INCH
Disk Sander



For smoother and more accurate work . . .

● You'll find this "Oliver" Sander will help your students do their finest work. Table tilts 45° down, 25° up. It is fitted with two gauges that enable you to smoothly sand angular and circular work without any fuss. This machine can also be used for grinding and polishing light metals. Write for Bulletin No. 182.

"Oliver" makes a complete line of woodworking equipment for school shops.

OLIVER MACHINERY COMPANY
GRAND RAPIDS 2, MICHIGAN

(Continued from page 20A)

Vernon milling machines and shapers, announce a new 10-in. bench lathe with a 1 1/16-in. hole through the spindle and an integral horizontal motor drive.

This new lathe has the basic features of larger industrial lathes: ¾-in. collet capacity (1-in. collet capacity with nose type collet chuck), tapered roller spindle bearings, double walled worm feed apron with power cross-feed, full quick change gearbox that gives a thread cutting range of from 4 to 224 threads per inch. The 4-step, V-belt motor drive is designed to take either a 1/3-h.p. or ½-h.p. motor.

For brief reference use IAVE—0604.

EQUALIZER ATTACHMENT

A new attachment, which makes it possible to plane boards 16 in. wide on an 8-in. jointer, has been perfected by J. D. Wallace & Co., 140 S. California Ave., Chicago 12, Ill.

The attachment is called an "equalizer" and consists of a heavy steel bar bolted in the rabbet ledge. This bar is fitted with an adjusting screw so that the end adjacent to the cutterhead can be adjusted tangent with the cutting circle of the knives. When not in use, the equalizer bar can be hinged back in the rabbet ledge, slightly below the surface of the rear table.

Equalizer attachment

To plane wide stock, the bar is first folded back out of the way and the material pushed through the machine to plane 8 in. of the surface. In effect, this makes a shallow 8-in. wide rabbet cut.

Then the equalizer bar is pivoted forward into position, tangent with the knives, and the stock is turned end for end so that the planed portion lays on the equalizer bar in starting the finish cut. Thus it guides the material into the cutterhead flush with the first cut, so that the second cut will blend into it without leaving a shoulder or joining mark.

The same device may be used to plane draft on patternwork up to 8 in. wide, as in making ribs for a pattern. On such work the infeed table is set lower than the knives for the amount of taper desired, for example ⅛ in. The left hand edge of the material is then guided over the equalizer bar in making the cut, so the cut tapers gradually from nothing at the left hand edge, to ⅛ in. deep at the right hand edge.

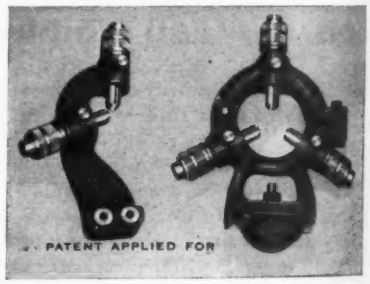
For installation on old machines a simple fixture with drill and tap spots the mounting holes.

For brief reference use IAVE—0605.

NEW SOUTH BEND LATHE WORK SUPPORTS

To provide quicker and more efficient operation on certain classes of lathe work, a de luxe type follower rest and center rest have been developed by the South Bend Lathe Works, 178 East Madison St., South Bend 22, Ind.

Principal features of both the follower rest and center rest are the wrenchless adjustment and locking of the jaws. Each jaw has a large knurled knob for adjusting the jaw position, and a thumb screw for locking. An ingeniously designed double acting compound screw thread provides approximately 3/16-in. jaw movement for each revolution of the adjusting knob. Smooth action, with just enough resistance to hold the jaw securely in position until it is locked with the thumbscrew, permits quick adjustment with extreme precision.



Lathe work supports

The jaws are made of brass and slide through precision steel sleeves which are pressed into the supporting frame. Manufactured to close tolerances throughout, the jaws and other parts are easily replaceable. Both the follower rest and center rest are available for current models of South Bend Lathes.

For brief reference use IAVE—0606.

DESIGNS AND METHODS IN PLASTICS

William Dixon, Inc., 32 E. Kinney St., Newark, N. J., have prepared an excellent little 24-page booklet on designs and methods in plastics.

The short but lucid directions treat of the material (plastics), shop supplies, tools, marking and cutting, filing and squaring, drilling, tapping, threading, transferring designs, engraving, carving, decorative piercing, inlaying, overlaying, bending, surfacing and polishing, and assembling.

(Continued on page 24A)

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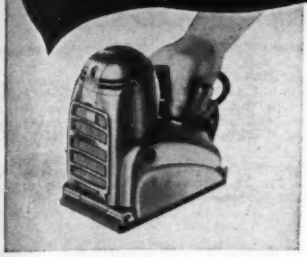
FOR FINISHING
WOOD • METAL • COMPOSITION



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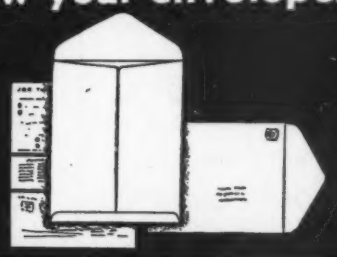

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"The Clamp Folks"

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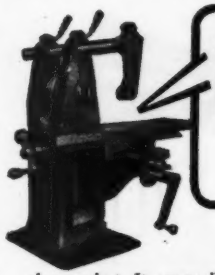

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read about me in

APRIL POPULAR SCIENCE!

● A comprehensive description of machining operations on this LEWIS MILL starts in April Popular Science. Use this detailed article as a ready-made shop project. Its many illustrations, drawings and instructive suggestions are easily understood by your students. Read it and consider its possibilities as an instruction piece in *your* class room!

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Badger - American Electrotype Co.
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407 East Michigan St., Milwaukee, Wis.

(Continued from page 22A)

Besides the foregoing, there are 10 plates of full size designs of various kinds.

The cost of this little booklet is 40 cents.

For brief reference use IAVE—0607.

HOBART ARC WELDING NEWS

"Hobart Arc Welding News" presents interesting photographs and articles on welding from all over the country. Most of these photographs and articles are reports of our readers' arc welding activities.

This publication is mailed free of charge to anyone interested in arc welding and will be mailed immediately on request to the publisher, The Hobart Brothers Co., Troy 1, Ohio.

For brief reference use IAVE—0608.

CURIOSITY SHOP

Alcoa's new technicolor motion picture, *Curiosity Shop,* is the story of research and development of the long and patient struggle of industrial scientists to make aluminum more useful. It is a tribute to the men who work quietly and tirelessly in their shops — whether the shop is a college lab, a great research center, Thomas Alva Edison's attic, Charles Martin Hall's woodshed, or a basement workshop.

Curiosity Shop tells the story of young romance complicated by the absorption of a youth in science to the temporary exclusion of his charming fiancée. John Litel plays the part of Gordon Harkness, the elderly father who returns to his alma mater to see his daughter, Marta (June Lockhart), graduate. It is the night of the senior prom but Bill McCann (Richard Hogan), June's date, forgets all about the dance when he and Harkness become involved in the development of Bill's television set. How the young couple finally contrive to have their last dance in college together comes in a clever twist at the end.

Curiosity Shop was produced in brilliant technicolor by Wilding Picture Productions, Inc. Sixteen and thirty-five millimeter prints will be available for school, church, and club showings July 1, 1948. Requests should be made to: Motion Picture Department, Aluminum Company of America, 801 Gulf Building, Pittsburgh 19, Pa.; Modern Talking Picture Service, 9 Rockefeller Plaza, New York 20, N. Y.; or Farm Film Foundation, 1731 Eye Street, N.W., Washington 6, D. C.

For brief reference use IAVE—0609.

U. S. GOVERNMENT FILMS

Castle Films, Division of United World Films, Inc., 455 Park Ave., New York 22, N. Y., has issued a new catalog listing more than 1000 visual aids for schools and industries — sound

(Continued on next page)

Craft PROJECTS

NEW BELT DESIGNS — LEATHERCRAFT MATERIALS

Quality Leathercraft Materials and Fittings for 29 years.

Portfolio of 10 NEW handbag patterns, full size, easy to follow instructions for transferring, tooling, etc. No. 332 only $1.30. 47 NEW Western and Novelty Belt Designs No. 397 set only 75 cents. A full stock of quality leather and lucite fittings. Large catalog with first order for materials.

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Write for details on its 17 advantages.

1 pt. - $7.43
1 qt. - 7.98
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Details also available on other Sta-Warms, 1 pt. to 8 qt., with automatic control.

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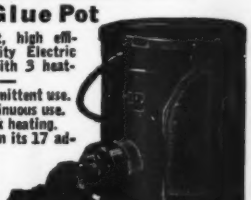

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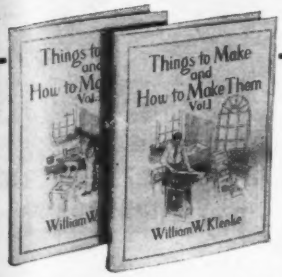

THINGS TO MAKE and How to Make Them Klenke

A wealth of information on projects in wood. In Vol. I — plans for making all equipment for the Home Workshop; Camp and Game Room; Lawn and Garden; Small Pieces for the Home; and Odd Pieces in Wood. Vol. II — Tables; Dressers, Chests, Desks, Cabinets; Chairs, Benches, etc.; Boys' Room Furniture; and various smaller pieces. Attractive, distinctive designs, complete with working drawings, specifications, and photographs of the finished articles. Vol. I, $4.25; Vol. II, $4.00.

Also available in ten paperbound books, published under the separate titles listed above. Book 1, 95 cents; Books 2 through 10, 65 cents each.

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Box 648 - IAV

(Continued from previous page)

motion pictures, and film strips (both silent and sound) produced by seven different agencies of the U. S. Government.

These visual aids may be purchased from local visual education dealers or directly from Castle Films.

The motion pictures are 16mm., some black and white, others in color. The films are divided under the following headings: rural America, science and nature, farming and gardening, farm animals, forestry, soil conservation, home economics, machineshop work, problems of supervision, engineering, plastics, refrigeration service, electrical work, farm work, automobile operation and maintenance, foundry work, woodworking, pattern making, shipbuilding, sheet-metal work, aircraft work, airplane maintenance, aerial navigation and flying, radio, aircraft and aircraft maintenance, etc.

For brief reference use IAVE—0610.

NEW PROJECT IDEA

The April issue of *Popular Science* carries an article which describes the machining operations for making a small milling machine, the castings and blueprints for which can be obtained from the Lewis Machine Tool Co., P.O. Box 7446, Sta. L, Dept. X, Los Angeles 23, Calif. This miller will be an excellent project for a machine-shop class.

Lewis castings for 23 power tools and special projects are available in either rough or semi-finished form. A free catalog can be had for the asking.

For brief reference use IAVE—0611.

NEW 14-IN. BAND SAW

A new brochure describing the Boice-Crane Company's 14-in. band saw, will be sent to anyone addressing the manufacturer at 974 W. Central Ave., Toledo 6, Ohio.

This band saw has received top rating from State Safety Commissions. All mechanism, motor, etc., are fully enclosed. No crossarms, or exposed moving parts. The blade tension scale is calibrated for all widths.

The saw has strong, light solid Textolite disk-wheels. Each wheel weighs only 2½ lb., permitting operation at near twice normal speed. Even at 1200 r.p.m. wheel speed, the resulting blade strain on Boice-Crane blades is 20 to 40 per cent less than other 14-in. machines which normally operate at 600 r.p.m.

The entire framework is electric-welded into a single, vibrationless, one-piece steel structure of great strength and stiffness. The motor is protected against all dust and grime.

The wheel guard is a single, hinged door, which must be closed before operating. The blade is guarded on all sides by a heavy steel telescoping guard, held friction tight in its ways by a compression spring. When lock handle is released the guard does not drop, but stays in place until operator repositions it. It also covers and shields the upper blade guide from accidental damage.

The blade guide adjustment controls are brought out to the rear so adjustments can be made safely, with the machine actually running, and also without the aid of any kind of special wrenches, or screw driver.

The guide features: one-knob setting control, independent microadjustment, anticreep locks, and large backup roller (sealed ball-bearing type).

The generous size worktable, 15 by 15½ in. is rigidly supported on two large trunnions, one at front, another at rear. No sag or vibration under heavy cuts. The blade-entry-slot leads to front (not the side) of table. Table tilts 45 degrees to right, 10 to left. Has 90 locating stop, also accurate table-tilt gauge. Removable throat piece is keyed so sides cannot strike blade.

Large steel cabinet stand provides a solid foundation — adding to the smooth performance.

(Continued on next page)

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Write for new Catalog No. 59, describing the complete line of Sterling Foundry Equipment.

Sterling FOUNDRY FLASKS
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Hammers — Files and Anvils for working these Metals

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(Continued from previous page)

Also furnishes a sealed-off, dust free compartment for motor, as well as extra blade storage.

For brief reference use IAVE—0612.

McGRAW-HILL TEXT FILMS

The first public showing of the new Text Films produced by the McGraw-Hill Book Co. Inc., was held on July 29 at the McGraw-Hill building before an audience of leading educators in the field of teacher training.

The films previewed are the first of several series of audio-visual teaching materials to be released this fall by McGraw-Hill. Each series is designed for direct correlation with a specific textbook. The films seen at this showing are part of a series based on the textbook, *Student Teaching* by Dr. Raleigh Schorling, School of Education, University of Michigan. This series, consisting of five 16mm. sound motion pictures and five silent follow-up film strips is recommended for pre-service and in-service teacher training courses.

Distribution of these teacher training films is expected to begin in late August. They will be available to individual users and to film rental libraries through direct purchase from the McGraw-Hill Book Company, Inc., 330 West 42nd St., New York 18, N. Y.

For brief reference use IAVE—0613.

AIRCO ANNOUNCES NEW HELIWELD FOLDER

The Air Reduction Sales Company has published a two-color, profusely illustrated, eight-page folder describing its three new types of Heliweld equipment. These are the manual holder, the machine holder, and the electronically controlled automatic head.

The new folder shows illustrations of Airco's three new types of Heliweld equipment. It lists advantages and uses of the process, construction details of the equipment, and a page of supplementary equipment and supplies.

For a copy of this new folder write Department 1632, Air Reduction Sales Company, .60 East 42nd Street, New York 17, N. Y., or the Airco sales office nearest you.

For brief reference use IAVE—0614.

NEW STENCIL SHEET SERVICES

Of particular interest to schools are two new stencil sheet services recently announced by A. B. Dick Co., 720 West Jackson Boulevard, Chicago, Ill., manufacturers of Mimeograph duplicators and Mimeograph brand products.

These services consist of the regular all-purpose Mimeotype 960 (legal size blue) stencil sheets with special guide lines to simplify the planning and typing of newspapers and four-page folders.

The school newspaper stencil sheet helps in the preparation of bulletins and booklets as well as

(Continued on next page)

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American Gas Furnace Co.
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TOOLS ALWAYS SHARP with PLURALITY OILSTONE TOOL GRINDERS

No. 450 Plurality Jr.

Now available in 3 sizes
No. 425 Plurality Sub Jr.
No. 450 Plurality Jr.
No. 475 Plurality

Grinding can be done on a cone, coarse or fine oilstone, leather stropping or emery wheels. Unit is compact, efficient, serviceable, easily accessible and has ball bearing direct motor drive. Especially guarded for school shop use. Details on request.

Mummert-Dixon Co. Hanover, Pa.
Originators and Pioneer Manufacturers of Oilstone Tool Grinders

(Continued from previous page)

newspapers and school annuals or any other material that may be divided into two- or three-column pages. The guide lines show column limitation lines for both two- and three-column layouts, and indicate the number of typewriter characters which may be used for both column widths in elite and pica type.

The four-page folder stencil sheet is a service that schools find convenient in the preparation of booklets, invitations, programs, announcements and other folders. The special form topping on the stencil sheet includes the duplicating area and line and character spacing. Instructions for using this stencil sheet are also form-topped on the lower portion of each stencil sheet.

For brief reference use IAVE–0615.

NEW PUBLICATIONS

(Continued from page 18A)

The book contains 32 plates to show the student how to obtain balance; present angular and curved forms; how to handle the fore, middle, and background; choose the center of interest, use perspective; and present boats and water; use contrast; present waterfront topics, and street scenes; light and shadows; trees and roadsides; and hills and woodland.

Creative Ceramics

By Katherine Morris Lester. Cloth, 213 pp., 6⅛ by 9 in., illus., $3.75. The Manual Arts Press, Peoria, Ill.

An excellent book written by a person who has had much experience teaching the subject about which she writes.

In her book she describes modeling in clay drawing upon nature, historic designs, and examples of foreign countries, as sources for the forms to be followed by the student.

Decorative tiles, ceramic ornament, pottery making, the potter's wheel, glazing and firing, mold making and casting, and finishing plaster casts, are all clearly explained both by words and illustration. The book also contains a useful glossary.

Kinematics of Machines

By Leon Marr Sahag. Cloth, 249 pp., 6¼ by 9⅛ in., illus., $4. The Ronald Press Co., New York, N. Y.

An analytical study of the motion of machine parts. The machine elements studied are cams, gears, and flexible links.

The mathemtics of motion also is studied, as is also the method of graphically plotting the paths of a moving body, and drawing the velocity diagrams of the various parts of a given mechanism.

Basic Tools for Woodworking

By Lee Frankl. Paper, 119 pp., 8¼ by 10⅝ in., illus. Prentice-Hall, Inc., New York City.

A book designed to give training through sight to students of woodworking. All of the tools and their uses are pictorially presented with short explanatory statements.

The tools covered are those used for driving, cutting, boring, holding, measuring, and marking.

The operations of making joints, nailing, gluing, and finishing also are presented in the same way as was used for the tools.

Pamphlets available from the American Management Association, 330 West 42nd St., New York 18, N. Y. All of these booklets are 6 by 9 in.

No. 65. Trends in Workmen's Compensation and Employee Benefits. Paper, 43 pp., 75 cents.

No. 83. Over-Hauling Pension and Profit-Sharing Plans. Paper, 32 pp., 50 cents.

No. 102. Management's Internal Public Relations. Paper, 42 pp., $1.

No. 103. Economic Fundamentals of Collective Bargaining. Paper, 46 pp., $1.

No. 104. Training for Management Skills. Paper, 32 pp., 75 cents.

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